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DISCOURSES

ON THE

NATURE AND CURE

OF

WOUNDS.

IN TWO VOLUMES.

By JOHN BELL, Surgeon.

THE SECOND EDITION.

VOL. I.

OF WOUNDS IN GENERAL.

OF PROCURING ADHESION.
OF WOUNDED ARTERIES.
OF GUN-SHOT WOUNDS.

OF THE MEDICAL TREATMENT OF WOUNDS.

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TO

ERASMUS DARWIN, M. D.

KNOWN TO THE AUTHOR ONLY BY HIS VALUABLE WORKS,

THIS BOOK IS PRESENTED,

AS AN HONEST AND INDEPENDENT TESTIMONY

OF

RESPECT AND GRATITUDE.

THOSE WHO, TO MEDICAL SKILL,

JOIN LIBERAL AND ELEGANT STUDIES,

ENNOBLE THEIR PROFESSION.

AND ARE ENTITLED TO FREQUENT MARKS OF PUBLIC ESTEEM.

THE

AUTHOR OF THESE DISCOURSES,

INSTEAD OF COURTING PATRONAGE,

THINKS HIMSELF MORE HONOURABLY EMPLOYED

IN THUS ACKNOWLEDGING

HIS SHARE OF

THE COMMON DEBT.

ADVERTISEMENT.

IT is becoming in an Author to give ſome reaſon to the Public why a book with ſo many faults is ſo little improved.

Theſe Diſcourſes on Wounds are too imperfect to be much altered, too good to be entirely thrown away.—The Plan was limited at the firſt, and the Work muſt remain in its original form, for, without changing its character it can hardly be improved.

Nothing more was deſigned than a ſketch, of a great and intereſting ſubject; but that ſketch has been favourably received; it has been found uſeful; an Edition of Sixteen Hundred Copies has been rapidly ſold; and the approbation of the Public forbids the Author ſaying much concerning thoſe imperfections which an Author muſt feel more ſenſibly than others, which, if he have a due reſpect for himſelf, he will be proud to acknowledge.

It is ſome time ſince theſe Diſcourſes were compoſed: The Author was, even at the firſt, conſcious of many imperfections, and is ſenſible that he now regards them with ſuch impartial and chaſtened approbation as a friend might indulge: The natural progreſs of the mind, when continually

employed in the purſuit of knowledge, inclines every man of ſenſe and diligence to think, perhaps, too humbly of paſt labours. The Author of this Elementary Book has been at pains to correct ſome of the many errors of the Firſt Edition, and ſhould be happy to make this more worthy of the approbation of the Public, or of thoſe Gentlemen to whom it is inſcribed.

But while he is employed in another work, in which the general principles of Surgery are more fully diſplayed, he ſhall feel himſelf greatly ſupported if the Public condeſcend to receive, with any degree of favour, this Second Edition of the Book on Wounds.

Edinburgh 1800.

PREFACE

TO THE

FIRST EDITION.

THE Author of theſe Diſcourſes will not allow himſelf the benefit of that apology, to which he is but too well entitled; for the apology of want of time ſurely is not reſpectful towards the Public: it intimates, that with time the Author could have written a more orderly and a better Book; an intimation which is always immodeſt, and often untrue. The Author knows but too well how often, in this book, the marks of hurry will ſtrike his Reader. He mentions his conſciouſneſs of this with regret! He feels the neceſſity of requeſting that indulgence which every author needs and claims.

THE very plan and title of this Book is new; and the Author has deviated from accuſtomed forms in this inſtance, from no other motive than the hope of making theſe Leſſons both

pleaſant and uſeful. This method of teaching by Diſcourſes is as yet untried: it may have its advantages, it muſt have its faults; and this increaſes that kind of anxiety which is inſeparable from the act of appearing before the Public, and which even the ſenſe of duty can hardly relieve.

The Author has endeavoured to bring into one eaſy and comprehenſive view, thoſe leſſer operations of Surgery, which are not found under that much abuſed title of a Complete Syſtem. He has endeavoured to intereſt his Reader, in the manner of managing wounded Arteries, and in many of the leſſer points of practice. He has attempted to refute ſome favourite doctrines, not wantonly, but boldly; "not becauſe they belong to this Doctor or that Profeſſor," but becauſe they ſeemed to him totally inconſiſtent with true philoſopy, and, incompatible with ſound Surgery, in as far as it is as yet founded upon a knowledge of the powers and principles of the human body. He has uſed all that freedom with great names which the cauſe of truth and ſcience requires: he has publiſhed boldly many criticiſms which he would not have ventured to mention in his Lectures, or in private;

for there criticiſm is no longer criticiſm, but the foul report and private malice of it works like a ſecret poiſon, againſt which there is no preventative nor cure. He has criticiſed the opinions of thoſe chiefly, who, being at the head of the profeſſion, are of courſe the beſt able, and, to all appearance alſo, the moſt willing to defend themſelves.

But the Author has never allowed any purſuit of this kind to break in upon the order or purpoſe of his Diſcourſe, which he has endeavoured to keep clear of all encumbrances, and in a plain and eaſy form: He has endeavoured to order it ſo, that his Reader may have firſt a free and general notion of each ſubject in the body of the Diſcourſe, and he has put down more expreſs and accurate rules at the concluſion of each: He has introduced the lighter pieces of hiſtory, to give eaſe and life to the ſubject; and to give it weight and firmneſs, he has added rules of practice. He has endeavoured to give comprehenſive and general notions, of Wounds —of Wounded Arteries—of Bruiſed or Gunſhot Wounds—and of Wounds of the Breaſt, Belly, Head, Throat, and Limbs, and eſpecially of the condition of Limbs wounded with dan-

gerous complications, as of lacerated Arteries and bruiſed Bones.

He truſts, that his manner of explaining theſe ſubjects will be plain and eaſy to the young Surgeon, to whom alone he preſumes to addreſs himſelf; and having thus honeſtly told his motives and his higheſt expectations, he hopes to find every indulgence; and may be permitted to ſay, with Lord Halifax, That he who is reſolved to play the critic with this Book on ſtricter terms, "muſt have a degree of generous irregularity in his reaſoning, elſe he will not be a good thing of his kind."

DISCOURSE I.

ON PROCURING ADHESION.

WHEN a modern ſurgeon allows himſelf to talk about the "mundifying, incarning, and cicatrizing of wounds, or directs how to fill the wound up with good and ſound fleſh, and keep it to a fair and even level with the adjacent ſkin," he but proclaims his own ignorance of the properties of the living body. Perhaps he talks this language idly, and in mere compliance with the uſual forms of ſpeaking; but if he has ſeriouſly any ſuch idea of the buſineſs and duties of a ſurgeon, there is much reaſon to fear, that his methods, far from incarning or cicatrizing wounds, will rather interfere with the regular proceſs of nature.

It is an old, but it is a becoming and modeſt thought, that in our profeſſion, we are but as the miniſters of nature: and indeed the ſurgeon, ſtill more than the phyſician, atchieves nothing by his own immediate power, but does all his ſervices by obſerving and managing the properties of the living body; where the living principle is ſo ſtrong and active in every part, that by that energy alone, it regenerates any loſt ſub-

ſtance, or re-unites in a more immediate way, the more ſimple wounds.

When we can prevail upon ourſelves to renounce this parade of idle words, and to reſign alſo our ſupreme office of aſſiſting nature in "mundifying, incarning, and cicatrizing wounds, of filling the wound with ſound fleſh, and of keeping it to the right level, ſo as to make an even and ſeemly ſcar," we ſhall find our duties happily reduced within the narroweſt bounds, viz. of ſaving the patient from immediate bleeding, and of laying the wounded parts ſo cleanly, ſo neatly, and ſo evenly in contact with each other, that they may adhere. The reſt we leave to nature.

I fear, that from my announcing a rule of conduct ſo ſimple as this is, you will ſuppoſe, that I mean to ſpeak only of the ſlighter, and more trivial wounds; while I do really mean to include under this general view, the greateſt and the ſmalleſt wounds; and to eſtabliſh but one rule for all, from the amputation of a limb, or the extirpation of a tumor, to the moſt trivial cut of the cheek or hand.

What is amputation but a wound? The greateſt wound,—clean and fair,—made carefully by the hand of the ſurgeon,—diſpoſed to heal in the eaſieſt way? And in this great wound, (which, à fortiori, includes the doctrine of every leſſer wound), what is there to attend to, but the procuring of adheſion, or the ſtopping of the flow of blood? What were the defects of the old operations, but that the ſurgeon knew not who to procure this adheſion? that he had no means by which he could ſtop the bleeding? The hæmor-

rhagy was fatal to moſt of thoſe who needed to ſuffer this operation; and the few who ſurvived, lingered through all the miſeries of a nine months cure, tedious and imperfect, with conical, ulcerated, and tender ſtumps.—What indeed is the chief perfection of modern ſurgery, or the excellency of our operations? but that in bleedings from great veſſels we truſt nothing to compreſſion, cauteries, or aſtringents, but tie our arteries firmly; and that we talk no longer about mundifying, incarning, or cicatrizing of wounds; that we never dreſs the cut ſurfaces as diſtinct wounds, but put the ſides or lips in cloſe contact, and keep them ſo. We boaſt nothing of our own powers, but truſt all to nature, whoſe buſineſs it is, to make thoſe ſurfaces adhere which will adhere, or to re-unite by the ſlower proceſs of ſuppuration and granulation, the parts among which there has been a loſs of ſubſtance.

Of theſe two great points, this of the ſpontaneous adheſion of parts, is what I ſhall firſt explain. This doctrine of the adheſion of cut ſurfaces, and the inoſculation of arteries, was but lately underſtood; and very ſlowly and unwillingly received. Indeed the tales which were at firſt told of it, were ſuch as might have diſcredited the whole; for it happened with this moſt important diſcovery of adheſion, as with the no leſs certain and curious phenomenon of the regeneration of the humours of the eye, or as with the intereſting experiment of the ſafe and eaſy transfuſion of the blood, that the extravagance of its inventors ruined the invention, and took away all hopes of profiting by it. Burhius and Kirkringius pretended to be poſſeſſed

of particular medicines by which they could reſtore the eye, after it had been burſt or cut open: and Taylor, Woolhouſe, and others, pretended to cure the blindneſs of old age, by extracting the muddy humours of the eye, and replacing them with freſh tranſparent humours, by which the ſight became as clear and fine, as in the youngeſt perſon *.

* Kirkringius tells his ſtory in the following lamentable terms: That the King of Denmark who was as ſkilful in ſciences, as clear in governing his realms, one day when he was reading a curious book upon glaſs-making, written by Andreas Friſius, aſked his Phyſician, Burhius, who was ſtanding by, whether this ſtory that the author told in his preface could be true, about cutting the eye open, and letting out the humours, and reſtoring it again? "O!" ſays Burhius, "That Theo-"dorus Kirkringius, mentioned there ſo honourably, is one of the "pooreſt of my ſcholars in this art." Kirkringius in revenge tells the whole ſtory; how he had heard of Burhius being poſſeſſed of this art; how he had wiſhed to aſk the ſecret; and how he was aſhamed to propoſe buying it with money from a gentleman like Burhius; how he ſtudied and laboured to find it out; and how he ſucceeded without any obligation to this fame Burhius. "Hoc ſcio, et hic profiteor "me nullo horum modorum oculos reſtituere; reſtituere tamen alia "prorſus ratione, aliiſque a me ſolo inventis viis addo; nec facere me "diſtinctionem inter albos et nigros, ſed quolibet oblato animali," &c. "It matters nothing to me whether the eyes be black, brown, or grey, "bring me what animal you pleaſe, I ſhall cut the eyes open, ſqueeze "out all the humors, give him back to you as blind as a mole, and yet "reſtore his eyeſight in a very little while: I have done it often for "fun, and have done it three times on the ſame dog." Now, this was what Burhius could not do according to Kirkringius; for Kirkringius tells how he was admitted to one of Burhius's exhibitions which failed, and the dog goes to this day in the ſtreets of Amſterdam blind of that eye. "Qui canis adhuc hic Amſtelodami vivit qui-"dem, ſed non vidit illo qui diſciſſus fuit oculo."

Many pretended to reſtore to the aged, health and ſtrength, by withdrawing from their ſyſtem the effete blood, and filling them up with healthy and youthful blood. In like manner, did Talicotius write his long and not inelegant book, about the reſtoration of parts of the body which had been loſt. And Garengeot had the boldneſs to tell a ſtory, about "a young fellow, a ſoldier, who, reeling out of a tavern drunk with ſome of his companions, got into a quarrel, in which one of them bit off his noſe, threw it into the gutter, and trod it under foot: He gathered his noſe up, flung it into Mr. Gallin's, an Apothecary's ſhp, ran after the fellow who had done it, and when he returned, Mr. Gallin waſhed the noſe at the well, ſtuck it with plaſters in its place, in two days after, it was firmly united, and Mr. Garengeot, four days after, dreſſed the noſe with his own hands."—Vid. Vol. III. p. 55. And if we may believe one writer of good abilities, the beſt modern ſtories of adheſion, (as of a tooth adhering to a cock's comb), are little better than Talicotian tales, or this by Garengeot of the ſoldier's noſe *.

But even when this doctrine of adheſion came to be ſpoken of in a ſenſible and modeſt way, and became a queſtion of the higheſt importance in practice, it was very difficultly and ſlowly received.

Thirty years ago, ſurgeons had no ſettled notions, that cut ſurfaces might be made to adhere: they had

* I had neglected to repeat this experiment myſelf. I mentioned here a doubt ſuggeſted by a modern writer. But my friend Aſtley Cooper, has ſince convinced me of the fact.

no motive for ſaving the ſkin; or when they had ſaved it, they did not know how to apply it to the other cut ſurfaces, nor how much it might contribute to a ſpeedy cure: if they extirpated a tumor, they cut away along with it all the ſurrounding ſkin: if they performed the trepan, they performed in a moſt regular manner that preliminary operation which they choſe to call ſcalping; or in plain terms, they cut away ſix or eight inches of that ſkin, which ſhould have ſaved the fractured ſkull from exfoliation, and ſhould have immediately covered and defended the brain: in performing amputation, they cut by one ſtroke down to the bone; and even when they performed the flap amputation, they dreſſed their ſtump and flap as diſtinct ſores. An exfoliation of the bone, in theſe older operations, was a thing unavoidable; ſo that it was part of their art and ſkill to procure exfoliation. And the filling up and final healing of their conical ſtump was ſo ſlow a proceſs; ſo imperfect; and ſo many exfoliations of the bone, with other lets and hinderances intervened, that it is no wonder their imagination was much occupied about the digeſting, incarning, and cicatrizing of wounds. Whenever a bone was laid bare, they believed that it muſt exfoliate before it could heal; until they ſaw this exfoliation perfect, till the bone had at leaſt thrown off an outer ſcale, they would not permit it to heal; they would not lay the ſkin down upon a wound upon the ſhin bone, if there was a lacerated ſcalp, they cut the torn piece off; a large part of the ſcalp could not be regenerated in leſs than ſeveral weeks or months; and ſo they made good their

opinion by their practice; for very generally in that ſpace of time, the whole, or a part at leaſt, of the expoſed bone, was thoroughly ſpoiled. Theſe were a few of the many miſtakes committed daily by the older ſurgeons; who were contented with their theories about incarning, and cicatrizing of wounds, too proud of their own art, and too little inclined to follow the ſimple ways of nature.

It was in the time of diſcuſſing this very point of amputation, and eſpecially in debating the ſubject of flap operations, that this diſcovery of the univerſal doctrine of adheſion began. The French ſurgeons had declared, not only that their flap amputation procured an eaſy and perfect cure, but they affirmed that often in three days, the fleſh of ſuch a ſtump had adhered. To this O'Halleran replies, with a rudeneſs and ignorance quite unparalleled. "I would aſk," ſays he, "the moſt ignorant tyro in our profeſſion, whether he ever ſaw, or heard even, of a wound, though no more than one inch long, united in ſo ſhort a time?" "Theſe tales are told," he adds, "with more confidence than veracity; healing by inoſculation, by the firſt intention, by immediate coaleſcence without ſuppuration, is merely chimerical and oppoſite to the rules of nature." This was the aſſertion of O'Halleran, himſelf an excellent and moſt judicious ſurgeon; and all the beſt ſurgeons of the preſent day, as Mr. White, Broomfield, &c. have followed his doctrine and practice; dreſſing their circular ſtumps with rolls of fine linen, laid within the circle of the ſtump; and when they amputate by the flap operation, they dreſs the flap and

the face of the ſtump as ſeparate ſores, till the twelfth day.

When O'Halleran talked this bold uncivil language about confidence and veracity, he little thought that he ſhould live to ſee the doctrine of adheſion followed by a univerſal practice of laying down the flap; or the moſt ordinary ſurgeon procuring ſometimes a perfect adheſion on the third day. But ſurgery has improved gradually within theſe twenty years. Obſervations have been carefully made, and publiſhed early in pamphlets or journals. Doctrine and practice have gone hand in hand. The particular practice of procuring adheſion belongs to no one perſon; but was paſſing continually from hand to hand, from one friend to another, the common doctrine and diſcourſe of the day. It was gradually extending in its application, and growing ſtrong, like every practical doctrine, by ſlow degrees. It was applied firſt to amputation; then to trepan; then to the extirpation of ſcirrhous mammæ; then to all great operations; then to all recent wounds. If we are more particularly indebted to any one man, it is to Allanſon; who continuing through all his practice to make neat operations, and careful notes, has given us the reſult, in a form and language which make his writings, notwithſtanding the nature of his ſubject, as pleaſant almoſt as they are profitable to read. And yet, (as O'Halleran ſays on another occaſion, p. 222.) "We muſt not wonder to find ſome people, ſcarcely known beyond their own ſphere of action, modeſtly whiſpering their claim to this honour." A quotation, which in its ſenſe and true meaning, may be fairly applied to the

preſent occaſion, word for word, all but one *. I have been at pains to repreſent this improvement as gradual and ſilent; as having obtained by general and

* Which of theſe words my reader ſhall ſtrike out, I ſhall leave to his own honour and good ſenſe to determine, after he ſhall have read the following quotation; obſerving, in the firſt place, that Mr. O'Halleran publiſhed his book chiefly with the deſign of teaching ſurgeons how to ſave ſkin; that Mr. Allanſon publiſhed his book to teach ſurgeons how to put that ſkin down ſo as to make it adhere; and that a third author, the only modern ſurgeon who has claimed the doctrine, is the only modern ſurgeon who does not underſtand its real value. He delivers the following curious hiſtory of this doctrine of adheſion: "As I conſider the improvement by which theſe ends "are effected as one of the moſt important in modern practice, I hope "to be excuſed if I ſhortly ſtate the ſhare I have had in the intro-"duction of it, before proceeding to deſcribe the operation itſelf.

"In the courſe of my education while attending the hoſpital here, "as well as the hoſpitals of London and Paris, the inconveniencies "ariſing from the want of attention to the ſaving of ſkin, in different "chirurgical operations ſtruck me ſtrongly, ſo that I was reſolved to "take every proper opportunity, in my own practice, of treating this "point with particular attention.

"From the year 1772, when I ſettled in buſineſs, I laid it down "as a maxim not to be deviated from, to ſave as much ſkin and cel-"lular ſubſtance in the removal of tumors, whether cancers, or others, "when the ſoundneſs of parts admitted of it, as would completely "cover the ſores," &c. &c.

"After this had been practiſed for ſeveral years, Mr. Allanſon of "Liverpool, in the year 1779, publiſhed ſome obſervations upon am-"putation, in which a method of operating is deſcribed," &c.

The claiming ſo late as the 1772, or rather the 1788, a diſcovery which was publiſhed by O'Halleran in the 1765, muſt excite ſome feelings very different from reſentment; but any one who claims in the 1788, the doctrine of adheſion, which Allanſon had ſo fully explained in the 1779, muſt be anſwered: And the anſwer is plainly

common conſent, by a ſlow communication of remarks from friend to friend, till at laſt the practice was fairly eſtabliſhed; and no man could fully claim an improvement in which every man had ſome little ſhare.

This univerſal doctrine and practice of procuring adheſion, has done more for ſurgery in a few years, and moſt eſpecially for the ſurgery of wounds, than any other general obſervation: not excepting even the

this, that ſeveral other paſſages of the ſame author ſhow, that he did not even underſtand what Mr. Allanſon was doing, *ex. gr.*

" When ſpeaking of the time in which ſtumps may be expected to " heal, I think it right to obſerve that it ſhould not be our object to " accompliſh a cure in the firſt inſtance, without the formation of " matter; it *commonly anſwers better* when effected in the more gradual " manner we have pointed out. When a ſtump heals ſuddenly, and " the edges of the divided ſkin adhere by the firſt intention, the te- " guments are apt to be puckered and uneven, and the ligatures of " the arteries are removed with difficulty, &c.

" It is my own opinion that the ſecondary union recommended by " Mr. O'Halleran is the beſt. The cure would appear to be in ge- " neral accompliſhed more quickly in this way than in any other; " even where the flap has not been applied to the ſore till the four- " teenth day, the cure has been completed before the fourth week, " whereas few, if any, cures have been effected ſo early where the " flap has been applied immediately after the operation."

A man who has invented a doctrine, very generally underſtands it, at leaſt as well as his neighbours, and puſhes his diſcovery rather beyond the mark.——But this author " cares not whether the ſkin be laid " down for adheſion, or whether we dreſs the flap and the ſtump as " two diſtinct forces." In ſhort, far from ſpeaking in the enthuſiaſtic paſſionate tone of one pleading for his own diſcovery, we may know that this does not belong to him by the very token which diſcovered to Solomon which of the two harlots was the mother of the living child, " for behold one of the women ſaid nay, but let it be neither " thine nor mine, but divide it."

greateſt of all diſcoveries, the circulation of the blood. It is now well proved, that ſkin will adhere to ſkin, fleſh to fleſh, bone to bone, and all theſe parts to each other. One part only of the human body, cartilage, will not adhere; I have ſeen many proofs that cartilage does not inflame, nor ulcerate, nor give out granulations, nor generate new fleſh, or at leaſt it does ſo very ſlowly. A wound heals over a cartilage, but not by uniting with it.—We amputate a toe, and the flaps unite in two days, but ſtill they have united with each other only, and not with the cartilage of the joint which we have cut; and in a luxated limb, we find that the bone continues diſplaced, the cartilage never inflames, never unites with the lacerated parts, never in any circumſtances adheres. For the proceſs of adheſion is really this: either the arteries of oppoſite ſurfaces inoſculate mouth to mouth, or rather each cut ſurface throws out a gluten; the gluten fills up the intermediate ſpace; into that gluten, the leſſer arteries of each cut ſurface force themſelves, and it is thus perhaps by the generation of a new intermediate ſubſtance, that the continuity and entireneſs of the part is ſo quickly reſtored. If any one point fail to adhere, there the wound muſt run into ſuppuration; becauſe at that point there is a ſeparation of parts, which being equivalent to a loſs of ſubſtance, requires the generation of new fleſh. When the oppoſite ſurfaces conſent and harmonize with each other, in their mode and period of action, then they adhere; and ſo ſkin adheres to ſkin, or fleſh to fleſh. But if one of the oppoſite parts enters in-

ſtantly into a lively action, while another has only a languid action, and enters into that action ſlowly, and at a long interval of time; the action of the one has expired, before that of the other has begun. Such parts therefore do not conſpire and harmonize in their action, nor can they unite with each other; but they may live and thrive independent of each other: and perhaps it may happen in this way, that oppoſite ſurfaces of ſkin or muſcle, may ſeem to be adhering firmly to the parts beneath them; while, perhaps they adhere to each other only, and merely cover the cartilage or bone, without having any direct connection with thoſe parts. The bone we ſee, (as in an old amputated limb), lives and thrives, is not limited in its new formation by the adheſion of ſurrounding parts, but grows out into a broad knob of callus or new bone. A griſtle alſo, (as in an amputated or luxated joint), retains its pure and lubricated form.

There are, no doubt, accidents both of the conſtitution and of the wound, which will prevent adheſion; for if the patient be of a bad habit of body; if he be lying in a foul hoſpital, in the midſt of putrid ſores, and breathing a contagious air; if he be ill of a fever, or flux, or any general diſeaſe; then the properties of the body being leſs perfect, his wound will not adhere: or if the wound be foul, made with a poiſoned weapon, or left with foreign bodies ſticking in it, or if blood be poured out into the cavity of the wound, (for blood in this caſe is but a foreign body*), or if

* It is not eaſy for any one who is not an enthuſiaſt in the "doctrine of life in the blood," to acknowledge all the very extraordinary concluſions which have been deduced from it.

there be a wounded lymphatic, or wounded ſalivary duct, a wounded inteſtine, or a bleeding artery or vein; any of theſe cauſes will prevent the immediate adheſion of the wound: or if it be a bruiſed or gun-ſhot wound, there is a deſtruction of parts; the loſt parts muſt be regenerated, and thoſe parts which remain, muſt enter into a new action for generating new parts, and ſo they cannot adhere.

This adheſion, then, is a property of the parts of the living body, which is perfect only while their ſtructure is entire; which operates only where the oppoſite parts touch each other by the fulleſt contact, and ſympathiſe with each other in their period and degree of action. It is interrupted if any foreign body be interpoſed; it is leſs perfect in every unhealthy condition of the ſyſtem;—but it is a property, of which we are now ſo well aſſured, that we look for its good effects in the greateſt as well as in the ſmalleſt wounds; and the union of a hare-lip after it has been cut and pinned, repreſents the perfection of that cure which we attempt in every greater operation, and more confidently, in every ſmaller wound; ſucceeding ſometimes as perfectly after an amputation of the thigh, as after the moſt trivial wound of the cheek.

This property of re-union in divided parts is proved, by every day's experience, to be ſo perfect, that where we do fail, (which, no doubt, is ſometimes owing to a bad habit of body), we have much reaſon to believe, it is owing to ſome negligence on our part; ſome extravaſated blood, ſome open artery, ſome

portion of detached bone left in the wound, or ſome awkward piece of dreſſing which lies betwixt the edges, which ſhould adhere; or moſt frequently to the want of that perfect and abſolute contact, which is ſo eſſential to the perfect adheſion, that every part of the wound which does not touch ſome oppoſite ſurface, muſt ſuppurate before it can heal. This is my chief motive for putting down carefully, in ſhort diſtinct rules, the ſeveral ways in which a wound may be put together, ſo as to make it adhere.

There is no wound in which we may not try with perfect ſafety to procure this adheſion: for nothing ſurely can be more kindly when applied to a wounded ſurface, than the oppoſite ſurface of the ſame wound; it has been but juſt ſeparated from the oppoſite ſurface; it may immediately adhere to it; though it do not adhere, no harm is done, ſtill the wound will ſuppurate as kindly, as freely, as if it had been roughly dreſſed with dry cadeſs, or ſome vulnerary balſam, or acrid ointment: If only a part ſuppurate, while one half perhaps adheres, then half our buſineſs is done: And in ſhort, this ſimple way of immediately cloſing a wound is both natural and ſafe.

1. A fair longitudinal cut in the ſkin only, may be brought together merely by a good ſticking plaſter; or by a piece of common black court-plaſter in ſmaller cuts; or by a plaſter of diachylon in large cuts. The plaſter ſhould be uſed in ſuperficial cuts of the face, hands, feet, &c. or even over the fleſhy parts, if little deeper than the ſkin; and in naked and bony parts, as in the hairy ſcalp, or on the back of the hand,

compreſſes laid upon each ſide of the cut, will keep its edges in cloſe contact with each other; and will ſo ſupport the ſticking plaſter, as to ſave the neceſſity of making a ſtitch with the needle, which is ſurely cruel wherever it is unneceſſary *. I have never found it neceſſary to uſe hare-lip pins in any piece of ſkin which lies ſolid upon a bone, as that of the face or ſcalp, or the back of the hand. I have never uſed any thing but plaſters merely, after little operations upon the forehead, face, or cheek; unleſs there was ſome loſs of ſubſtance †.

2. In ſome looſer parts of the ſkin, eſpecially when moved by ſtrong muſcles, we either make a ſtitch of the needle, or we uſe rather what is called the twiſted ſuture, or hare-lip ſuture, which is the largeſt of all. Thus the lip, for example, is ſo retracted by all the

* Sutures make knotty ſcars, and therefore whenever (in the face eſpecially) a plaſter will anſwer the purpoſe, we ſhould avoid them.

† The older authors chooſe to call this manner of applying plaſters by the affected and abſurd name of SUTURA SICCA, or dry ſuture. In applying ſuch a plaſter, we are careful firſt to let the bleeding ſubſide; —then to make an aſſiſtant put the lips of the wound neatly together; then we apply one end of the ſticking plaſter to the ſkin on one ſide of the wound, and let it dry and fix there, ſo that we may pull by it; —then we pull that edge by the plaſter;—then moiſten the remaining half of the plaſter;—then lay it neatly down over the oppoſite edge of the wound;—then apply ſucceſſive plaſters till we have croſſed the whole line of the wound:—Then, if any one of the ſlips of plaſter has loſt its hold by the oozing out of the blood, we take it gently off, wipe the ſurface, and apply a new one neatly, until we have got the whole clean and fair, all the plaſters ſticking ſoundly; and, laſtly, We lay a compreſs over the whole, which we bind down a little with a circular roller, in order to prevent internal bleeding.

muſcles of the cheeks, that when cut it gapes much, and requires to be very well ſecured; therefore after cutting the edges of a hare-lip, or after cutting out a cancer of the lip, we put the broad edges neatly together; transfix both lips at points exactly oppoſite to each other with a large pin, which is called, (from this particular operation), the hare-lip pin; we paſs two pins through the lip, one at the very edge, or vermilion part of the lip, and one in the middle of the cut, and then twiſt a thread about them in the form of a figure of 8. This is named the hare-lip ſuture.

This ſuture may be uſed in any other ſuperficial wound of the ſkin. It is leſs neceſſary in the ſcalp, and other firm parts which lie over the bone. It is more neceſſary in the looſer, and eſpecially in the more muſcular parts, as in the lip, or perhaps in the cheek. In accidental wounds of the lip, in boys, I have uſed the common ſewing needle, which paſſes with very tolerable eaſe.

3. In angular wounds of the ſkin, a ſtitch of the needle will be uſeful, to keep up the corner to the angle which it belongs to; and this of courſe, ſupports the ſides, and keeps them in contact. Then we ſhall ſeldom find it neceſſary to make more than one ſtitch, and that exactly in the place of the angle; this ſtitch will ſupport the angle, and the ſticking plaſters may be laid ſo as to ſupport the ſides.

4. Long wounds, down to the fleſhy parts, even though they have no angle, will need ſtitches; if the cut be acroſs the line of a muſcle, the gaping will be greater; if it run along the courſe of the muſcle, the gaping

ill be leſs; but ſtill ſuch as to require a ſtitch. A long fleſhy wound will require ſtitches, even for that gaping, which ariſes merely from the length of the wound, independent of the contraction of the muſcular fleſh; and the ſtitches muſt be multiplied, according to the length of the wound; making, for each inch of the wound, one ſtitch of the needle*. From this interruption, theſe ſeparate ſtitches have been named the Interrupted Suture. The ſtitches counteract the general retraction, they keep the ſeparated parts in contact; but to keep the whole edge of the wound neat, one ſlip of black plaſter muſt be laid in the interſtice of each ſtitch. Theſe plaſters keep the whole wound even; ſupport the ſtitches, ſo as to leave leſs ſtraining upon thoſe ſeparate points; and enable you to cut your ſtitches early out, for a reaſon which I ſhall preſently explain to you†.

* Perhaps, as a general rule, the following directions from one of our oldeſt and beſt authors may be followed.—"If the wound be of two "fingers breadth, make one ſtitch in the middle; if three fingers "breadth, make two ſtitches; if four fingers breadth, three ſtitches; "and ſo go on, making a ſtitch leſs than the wound is in number of "fingers: Sometimes in declining parts we make our ſtitches at a "little more diſtance."—*Wiſeman.*

† The older ſurgeons were very proud of their ſutures, and ſtill prouder of the names they gave them. They called it a Continued Suture, when they ſewed the wound all along like a ſeam; they called it the Glover's Suture, when they paſſed their needles alternately from the inſide to the outſide of the wound; they alſo uſed the Shoemaker's and the Taylor's Suture. They called it the Interrupted Suture, when they cloſed a long wound by interrupted ſtitches; and Twiſted Suture, when they uſed pins as in hare-lip; they called it the Quilled Suture when they uſed the quills; the Gaſtro-raphia, when they ſewed a

5. If the wound be ſtill deeper among the muſcular fleſh, the ſtitches cannot go to the bottom of the wound; the ſtitches muſt be ſupported, and the bottom muſt be preſſed together by compreſſes, and the uniting bandage: This bandage is made by putting a double headed roller round the part, paſſing one head of the roller through a ſlit in the oppoſite ſide of it, and drawing both at once.

6. If the wound be pretty deep among the muſcular fleſh, ſo that the ſeveral ſtitches of the interrupted ſuture would make, (if tied by the common knots), an awkward and painful ſuture, likely to excite inflammation; we then convert the interrupted ſuture, into what is called, the Quilled Suture: which is made by ſplitting each end of the ligature, (after the ſtitches are made), into two threads; then laying a quill or bougie along each ſide of the wound, we tie all the ligatures of one ſide round one bougie; then draw that bougie

wound of the belly; and the Intro-raphia, when they ſewed a wounded gut.—They had particular needles for ſewing tendons; they had the diſtinctions of Sutura Sicca, and SuturaCruen ta, the moiſt and dry ſutures; i. e. the bloody ſutures in which they uſed the needles, and the dry ſutures in which they uſed only plaſters. But the moſt abſurd and dangerous of all their ſutures, was what they choſe to call the Reſtrictive Suture, (or rather they gave the general name of reſtrictive ſuture to all cloſe ſutures), intending by the cloſeneſs of their ſutures, not only to cloſe the wound, but to bind it ſo firm as to prevent the bleeding from any large veſſel within the wound. Their reſtrictive ſutures were as abſurd as the expectation of the firſt inventors of the flap amputation were, who ſewed their large flaps of ſkin, not to procure a more ſpeedy cure or a fleſhy ſtump, but to prevent the bleeding; for which purpoſe they bound down the flap upon the face of the ſtump, and kept it there with buckles and belts, and all kind of machinery.

tight down, by pulling the ligatures from the other ſide; then tie the ligatures alſo on the other ſide, round the oppoſite bougie; ſo that the two bougies, like two large rolls, keep the ſides of the wound neat and even. The preſſure is downwards towards the bottom of the wound, at leaſt, it extends as deep as the ligatures; ſo there is leſs need for helping this future with compreſſion; but we may ſtill put our ſticking plaſters in the interſtice of each ſtitch*.

.7. But there is a degree of prudence in refraining from ſtitches in deep muſcular wounds; for ſtitches, after all, can ſupport only the edges of the wound, while it is the compreſs and the uniting bandage that muſt ſupport all below. Deep muſcular wounds, then, ſhould be ſecured chiefly by the compreſs and uniting bandage. Stitches ſhould, in ſuch wounds, be uſed with reſerv e Thoſe who have uſed ſtitches the moſt confidently, have been forced, as ſuddenly, to cut them out again. —A point which is well illuſtrated by the caſe of a ſoldier, who, being wounded at the corps de garde with a ſabre-cut acroſs the ſhoulder, through the belly

* This is not exactly what was meant by the older ſurgeons when they uſed this quilled future; for they ſuppoſed that a deep muſcular wound could not ſafely be brought together; they wiſhed to bring it together at the bottom, but were afraid to cloſe it at the mouth, leſt that ſhould confine the matter. They uſed the quilled future with this intention, as beſt contrived for cloſing the bottom of the wound without ſtraitening its mouth; for the thread goes down to the bottom of the wound, but the bougies are far from the mouth, the threads in this, as in every ſtitch of the ſurgical needle, being always brought through the ſkin an inch diſtant from the lips of the wound.

of the deltoid muſcle, his ſurgeon ſewed the wound that night, with many deep ſtitches; theſe M. Pibrac was next morning obliged to cut, on accouut of convulſions of the arm, which ceaſed the moment that thoſe cruel ſtitches were undone*.—Such deep ſutures may be fairly enough compared with the croſs ſtitch of Paræus, which killed the patient; ſometimes by convulſions, ſometimes by high inflammations, with a total gangrene of the ſtump.

8. There is alſo a degree of prudence to be obſerved in uſing ſtitches in unhealthy patients, where we are almoſt aſſured, that the parts cannot adhere; or in foul hoſpitals, where all kinds of wounds are apt to fall into a foul eryſipelatous inflammation, of the low and gangrenous kind. For ſtitches muſt always, by exciting high inflammation, do much harm, whenever they do not do immediate good.

9. Whether the wound be broad in form of a flap, or long and deep, or a penetrating wound, there is much danger, leſt the ſides of ſuch a wound be not kept in cloſe contact; in ſuch wounds we lay long or flat compreſſes along the tract of the wound, keeping them firm with a broad and firm rolled bandage, (what long ago they called the Expulſive Bandage), which both prevents collections of matter, and brings the ſides of the ſore into contact. And every ſurgeon, knowing the intention, muſt have ingenuity enough to ſhape his compreſſes long or flat, or round or ſquare, according to the form of the wound, and to draw his bandage tighter juſt as the occaſion requires.

* Mem. de l'Academie de Chirurgie.

10. In deep muſcular cuts, where there is bleeding, and conſiderable veſſels are wounded, we firſt apply the tourniquet, then tie the arteries; then undo the tourniquet to ſee that the arteries be really ſecured; then ſcrew the tourniquet again, that not even an oozing of blood may interupt our next operation, viz. the cloſing of the wound; then ſew the wound according to its nature, or its ſize, leaving the ligatures of the arteries hanging from a corner of the wound; and though perhaps the whole will not adhere, yet much will adhere; we always have our chance of a total adheſion; the ligature keeps a little part open for itſelf, with a little ſuppuration round it, but attended with no pain; and it comes eaſily away the fourth or fifth day *.

* "The way," ſays Wiſeman "to ſtop the bleeding, as it is com-
"mon in all wounds, is by bringing the lips of the wound cloſe toge-
"ther by ſuture, and by applying ſuch mendicaments to them as have
"a drying and agglutinative faculty."—Theſe notions our older writers got from the celebrated French ſurgeon, Guido de Cauliaco, who ſays, "Sutura reſtrictiva fit, quando aliæ ſuturæ non fieri poſſunt
"propter magnum ſanguinis impetum."—And he adds, that this, after all, is not a ſuture to be depended upon; for if but one ſtitch burſt, the whole gives way;—"Suſpecta tamen eſt, quia rupto uno
"puncto, cetera relaxantur."

Guy de Chauliac had in his turn copied from the Arabians in moſt points, and very expreſsly in this buſineſs of ſutures; ſo that we find this buſineſs of the reſtrictive ſutures to have begun with the Arabians, who knew the way of uſing needles in cloſing wounds, but had not learnt to uſe the needle in tying arteries, otherwiſe than by ſewing the wound juſt ſo much the cloſer and tighter in proportion to the bleeding; they directed the ſuture to be made cloſe and firm, like that ſu-

11. Even though the bone be wounded or cut up, this ſtill makes no change in our intentions, nor in the ſurgery of the wound; for the bone alſo may adhere, and perhaps the re-union proceeds thus: We put down the bone and cover it with the ſkin in cloſe contact, and the ſkin adheres; the bone itſelf, moſt probably does not, in the ſtricteſt ſenſe, adhere; or at leaſt, its adheſion is different in its period, and in its manner, from that of the ſkin, and yet it is like it; for the outward wound is healed, the wounded bone throws out its mucus, that mucus becomes vaſcular, then bone is ſecreted; then a kind of callus is formed to heal the cut bone: and all this proceſs going on within! The bone ſeems to have adhered at the very time of the adheſion of its ſoft parts. But it is very particular, that in all fractures, great as well as ſmall, and of courſe, in all wounds of the bones, the bone never heals, till the outward wound is firſt healed, ſo as to reſtore the continuity of the veſſels, and enable them to begin the ſecretion of new bone. However the theory ſhall ſtand, it is comfortable to be thus aſſured of the fact; that if a bone be wounded or cut, ſo as to be turned up, or though a piece be cut away

ture which the currier makes, when he mends breaches in the tanned ſkin.

This is the true hiſtory of one of our ſutures, and the reaſon of its two names, viz. Reſtrictive and Continued Suture; and from this hiſtory it may be underſtood, that even the name ſhould be no longer heard. As for the other uſe and reaſon which ſurgeons have aſſigned for retaining this future, viz. that of ſewing the cut inteſtine cloſer, that ſhall alſo be diſcuſſed in explaining Wounds of the Belly.

from a bone, if that piece ſtill preſerve its connexion with the ſoft parts entire, it may ſtill adhere, live, and be reſtored. And the general wound may be made to adhere as firmly with a cut bone in it, as if it were a ſimple cut. How otherwiſe could we make the ſurfaces of an amputated ſtump adhere, it being the largeſt wound, having in it the largeſt cut bone?

12. The laſt direction which I have to give you, relates to the approach of inflammation; for I cannot allow myſelf to call it inflammation, when the part adheres; this indeed were no better, than to call a cure a diſeaſe.

The adheſive inflammation, (as it is called inflammation), is not attended with fever, pain, ſwelling, nor redneſs, unleſs in the moſt trivial degree; indeed that gentle ſwelling which indicates the fulneſs, and ſtrong but healthy action of the veſſels, it muſt have; but the increaſed action of thoſe veſſels, in re-uniting the lips of a wound, ſtands on the ſame footing with the healthy action of veſſels, in forming or in ſupporting any part of the ſyſtem. A bone is formed and completed by the action, fulneſs, and turgeſcence of thoſe arteries which are deſtined to form it; a ſpoiled bone is regenerated by an increaſed action and fulneſs of thoſe veſſels; the callus, which re-unites a broken bone, is formed by a full, but ſlow and regular action of thoſe arteries, which extend from the ends of the bone, and meet each other; and whenever veſſels extending either from the ends of a broken bone, or from the edges of any wound in the ſoft parts, meet each other, the

part is entire again; they form a perfect ſyſtem of circulation; and thus from the very firſt moment of adheſion the veſſels begin a healthy action, unaccompanied with inflammation or pain; and the part is once more entire, and ſound. If the veſſels become thus entire from the very moment of their re-union, if neither pain nor inflammation come on, unleſs the proceſs fail, and the veſſels begin to part, how can this be called a diſeaſe? or, by what ſophiſtry can it be comprehended under the definition of an inflamed part? To ſpeak thus appears to me, to give an incorrect and unfavourable view; it is to deſcribe the cure, by the very name of the only diſeaſe which can interrupt the cure. I muſt therefore conſider the part as going on in a ſound action while it continues to adhere, and ſhall proceed in deſcribing what is to be done if the wound ſhould begin to ſeparate and open; or in other terms, ſhould begin to inflame.

Adheſion prevents inflammation; when the parts adhere, they enter into a healthy action, they are entire, and they do not inflame; whenever any part is not in contact, and does not adhere, it muſt inflame; whenever one part is left thus ſeparate, its inflammation may extend to the adhering part of the wound, and ſo one detached point may endanger the whole. The ſtitches are themſelves a cauſe of inflammation, (which again is always the cauſe of the opening and burſting of the wound); and ſo the inflammation around the pins or ſtitches, endangers the whole. If the ſtitches be too tight pulled, this bracing up of the ſtitches inflames the wound; and ſometimes the timely undoing

of the ſtitches, prevents this opening of the wound; if there be blood poured out under the wounded part of the ſkin, it ſeparates the ſkin from the parts below, which is exactly equivalent to the ſeparation of the edges of the wound itſelf:—that alſo endangers the whole. From all which you will conclude, that the moment you obſerve pain, inflammation, and ſwelling of the wound, a ſeparation or gaping of its lips, the ſtitches tenſe, and the points where the ſtitches paſs particularly inflamed, you ought to undo your bandages, draw out your pins, or cut your ſtitches, and take away every thing that is like ſtricture upon the wound; theſe prudent meaſures may abate the riſing inflammation, and prevent the total ſeparation of the ſkin; while you may ſtill endeavour to keep the wound tolerably cloſe, by the more gentle means of ſticking plaſters.

But ſhould the inflammation riſe ſtill higher, and ſhould you perceive that a total ſeparation and turning out of the wound is inevitable; you muſt throw all looſe, put a large ſoft poultice round the whole, and forſake, without heſitation, all hopes of procuring adheſion; for ſhould you, in this critical juncture, perſiſt in keeping the parts together with ſutures, the inflammation would, in the form of Eryſipilas, extend itſelf over the whole limb, attended with a fetid and bloody ſuppuration, waſting the ſkin, with great loſs of ſubſtance. Therefore, throw all looſe, apply your poultice, allow the wound to ſeparate right as it is, and to paſs ſlowly into a ſoft and eaſy ſtate of ſuppuration; and then, a ſecond time, try to bring the edges up to

one another, not by ſtitches, but by adheſive ſtraps, or by a gentle bandage.

When the wound has fallen into a full ſuppuration, then the ſuppuration, granulation, and all that follows, belong (as indeed adheſion alſo does), to nature alone; over which we have no other power than that of ſupporting the action of the parts, i. e. keeping the ſyſtem in good health: and when the ſuppuration goes wrong, it is, in general, by taking the form of a profuſe thin gleety diſcharge; and this profuſe diſcharge is to be ſuppreſſed, and the right ſuppuration reſtored by bark, wine, rich diet, and good air: and this is what is uſually meant by ſupporting the ſuppuration, or moderating the profuſe diſcharge.

DISCOURSE II.

ON WOUNDED ARTERIES.

OF all the ſudden accidents which demand the aſſiſtance of the ſurgeon, no one requires ſuch abſolute preſence of mind, and ſuch perfect knowledge of Anatomy, as the bleeding from any great artery. I cannot conceive how a man of real feeling can, in our profeſſion, paſs one compoſed or eaſy hour, without knowing thoroughly the courſe and value of the great arterial trunks. Without this preparation, the ſurgeon lies continually expoſed to accidents, which may, in a ſingle moment, ruin his profeſſional character, and blight all his faireſt proſpects of ſucceſs. Without this knowledge of the blood-veſſels, a modern practitioner is much in the condition of thoſe who lived in times before the needle was invented, when the ſurgeon durſt not cut the moſt trifling tumor, or did it with fear and trembling; when often an operation apparently eaſy, coſt the patient his life. But with a due preparation, even the youngeſt ſurgeon now knows how to ſpeak in conſultation, and how to perform his operations; where to be afraid, and where to venture

upon a bold and reſolute thing. The greater operations are eaſily done, while the croſs accidents of practice, the wounds of arteries, the conſultations about aneuriſms, and other conſultations about organic diſeaſes, are the only proper teſts of the ſurgeon's ſkill.

Even the few directions which I ſhall be able to give in this ſhort diſcourſe, will bring this appeal to bear ſtrongly upon your minds, and will vindicate any thing that I might chooſe to ſay, either in reproof of negligence, or in praiſe of diligence, in regard to this the moſt important of all ſtudies, the ſtudy of the blood-veſſels! to which Haller and Petit, the greateſt maſters in anatomy and in ſurgery, had devoted ſo much of their labour.

The chief queſtions in this intereſting ſubject, are theſe:

1. What is the real importance of a GREAT ARTERIAL TRUNK in any limb? and what is the true value of its leſſer branches, of its inoſculating arteries, of thoſe intricate connections, which, in accidents of the main trunk, enable the ſmaller branches to ſupply and nouriſh the limb?

2. What is the form which a wounded artery aſſumes? how is it covered? What parts form that bag which we call an ANEURISM, and which, both from the danger of its burſting, and our fear of gangrene, is conſidered as a moſt dangerous diſeaſe? How may the operation, in this wound of a great artery, be moſt ſafely performed?

3. Or ſince, even by bleedings from the SMALLER ARTERIES, our patient ſometimes dies; how ſhould we

manage theſe ſmaller arteries? The needle, the compreſs, the ſponge, the ſtyptic waters, are all of them uſed, rather, as it ſhould ſeem, according to the faſhion of the day; or to mere accident or caprice: But are there not certain accidents, or certain parts of the body in which each of theſe will be found more or leſs ſerviceable, according to fixed and ſteady rules?

I believe theſe to be the chief queſtions; and if, in the courſe of theſe inſtructions, I ſhould try to teach you your duty according to ſettled rules, they muſt be rules belonging rather to the general point of wounded arteries than to the ſurgery of particular wounds; whatever general rules I now venture to lay down, you muſt learn by your own prudence and good ſenſe, to apply according to the accidents and circumſtances of each individual caſe.

OF THE ANATOMY OF THE GREAT ARTERIAL TRUNKS AND OF THE TRUE VALUE OF THEIR INOSCULATING ARTERIES.

In the managing of bleeding-veſſels, the ſurgeon is not only vexed with the difficulties of tying the bleeding-veſſels, but his mind is diſcompoſed with fears and doubts about his ſucceſs; and ſurgeons, who are old in practice, and ſhould know where the danger is, always put this aphoriſm at the head of their moſt intereſting chapter: "When the brachial or femoral artery is wounded, though the patient ſhould not periſh by the hæmorrhagy, the limb muſt ſoon die for want of nouriſhment *." And further, to excite the fears

* Gooch, p. 71.

of the young ſurgeon, he is told, "That in ſuch caſe, the progreſs towards putrefaction will be very ſwift." "A wound of this kind, very generally requires amputation;" and of courſe, not one precious moment is to be loſt in delay. If this were the right and legitimate concluſion, my directions about the bleeding from dangerous wounds, ſhould end with a few ſimple directions about tying arteries with the needle, or in difficult caſes, thruſting down a piece of ſponge into the wound! But I am perſuaded, that it is our duty in all ſuch caſes, to tie up even the great arteries of the thigh or arm, cloſe to that very point where they come out from the body, and I hope to ſet up an aphoriſm, at the end of this diſcourſe, the very reverſe of that common rule with which it begins.

This important queſtion reſts upon two points only; the anatomy, and the facts: and although we might, by tracing the arteries of the thigh, ſatisfy ourſelves that the inoſculations are ſufficient, where its great artery is wounded, to ſave the limb; yet we can be aſſured of this only by facts.

The hiſtory of this piece of ſtudy, viz. the inoſculations of the femoral artery, is indeed very curious; for nothing ſurely can be more ſurpriſing than to obſerve ſurgeons, intereſted as they are in knowing ſo great an artery thoroughly, diſputing every day the queſtion of its inoſculations, nay, what is worſe than all, in the daily practice of cutting off limbs, fearing leſt thoſe very inoſculations ſhould not be ſufficient to ſupport the limb; contenting themſelves with talking about it merely, not knowing, by actual diſſection, whether there

be two great branches of the femoral artery running down the thigh, or one only.

The anatomy of the femoral artery is ſimply this: The great artery, before it emerges from the belly, and while it ſtill retains the name of ILIAC ARTERY, divides into two great branches;—the INTERNAL ILIAC, or Hypogaſtric Artery, which deſcends into the pelvis; and the EXTERNAL ILIAC or Femoral Artery, which goes downwards along the thigh.

Of the INTERNAL ILIAC or Hypogaſtric Artery, the chief branches go out from the pelvis, through the ſciatic notch, or through the thyriod hole; they eſcape from the pelvis, go round among the glutæi muſcles, and play about the joint of the hip, holding large communications with the uppermoſt arteries of the thigh.

The EXTERNAL ILIAC or Femoral Artery, having gone down from the belly, and emerged from beneath the crural arch, deſcends into the thigh. Its firſt buſineſs is to furniſh the thick muſcles and fleſh of the thigh itſelf; about four fingers breadth, therefore, below the abdomen it forks into two great arteries, equal in ſize; one deſtined for the leg, and one appropriated to the thigh. That which belongs to the thigh, plunges immediately into the thick fleſh of the thigh, ſending branches upwards towards the hip-joint, and downwards towards the knee: from its going thus deep, it is named the PROFUNDA FEMORIS; from its ſpreading itſelf among the muſcles, it was known among the older anatomiſts under the name of the MUSCULAR Artery of the Thigh. The main trunk of the artery, having given off this profunda, lies ſuper-

ficially along the thigh; gives none but the moſt trifling branches to the muſcles of the thigh; goes down to the leg unexhauſted; and its chief peculiarity is, that having deſcended into the ham, it gives off branches of the ſize of a crow-quill, three in number, which play round the knee-joint, and are named from this circumſtance, the ARTICULAR Arteries of the Knee.

Here, then, the firſt thing that ſtrikes our eye is that this artery, lying ſo much nearer the ſurface, and going downwards towards the leg, ſhould be named, not FEMORAL, but CRURAL ARTERY; while the profunda or deeper artery, ſince it plunges among the muſcles to nouriſh them, is the right and proper artery of the thigh.

The next thing to be obſerved is this, that the arteria profunda, being as big as the femoral artery, ſupplying the whole fleſh of the thigh, running upwards towards the hip-joint, and downwards towards the knee, muſt have large inoſculations; and if it can draw blood enough from above, will eaſily tranſmit it to the lower parts:—in ſhort, that ſo great a trunk as this muſt be quite competent to the nouriſhing of the thigh.

But this concluſion is of too much importance, to be allowed to float thus looſe and unſettled in the ſurgeon's mind. It is not enough, that he thinks and believes that the artery will anſwer this great purpoſe; nor that he hopes to ſave the limb; that at leaſt he may try:—He muſt not only think himſelf entitled to tie the artery without blame, but he muſt be able to do ſo confidently

and boldly, and with great hopes of ſucceſs. To acquire this ſtate of mind, he muſt not linger in this kind of heſitation; he ſhould ſee and examine the preciſe arteries from which he is to expect a cure. And the neceſſity of ſuch an examination appears more ſtrongly, when we ſee ſurgeons of the greateſt experience, directing that every limb wounded in the great artery, be cut off*.

When we examine the branches of the Profunda, we find the Profunda lying a great inoſculating trunk, betwixt the arteries of the pelvis and the arteries of the knee; its firſt branches turning up to meet the arteries of the pelvis; its lower branches turning downwards to meet thoſe of the knee; ſo that although the proper office of this artery is to nouriſh the thigh, one accidental, but yet important office of it is, to inoſculate with other arteries. Thus, by theſe conjoined offices, the economy of the limb is perfect; the limb is nouriſhed during health; and it is ſupported by new circles of blood, when any accident touches the great trunk.

* That theſe ſlight deſcriptions of the arteries, and the arguments which proceed upon them, might be intelligible, I deſired my pupil Mr. Mochler to cut up the fore part of the thigh, and ſhow the place where the Profunda goes off; and next, to be at ſome pains in diſſecting out the whole line of the artery, and laying it out upon a board; from theſe two ſteps of the operation, I have drawn the two plates, but ſtill they are to be conſidered only as haſty ſketches; ſufficient for illuſtrating this point, but not abſolutely correct. The one repreſenting, in the form of a drawing, the place of the thigh at which the artery forks; the other repreſenting, in the form of a plan, the general tendency of the inoſculations.

The anatomy of the Profunda may now be cleared in two ſhort ſentences:——Firſt, The two uppermoſt branches of the Profunda go off from the very root of the artery, almoſt touching the great Femoral Artery; they are very large; they turn quick and ſuddenly round the hip joint; they are named the CIRCUMFLEX Arteries of the hip-joint; and both theſe arteries inoſculate upwards with the arteries of the haunch, which come from within the pelvis:——Secondly, The Profunda has uſually three great branches running downwards, among the muſcles of the thigh; they go through among the muſcles, and of courſe perforate from the fore to the back parts of the thigh; theſe again are called the PERFORATING Arteries: they inoſculate downwards with the articular arteries of the knee.——Thus, in this ſlight ſketch, is chalked out the propoſition, which I mean to eſtabliſh more fully, viz. That the profunda lies as a great inoſculating trunk betwixt the arteries ſurrounding the hip joint, and the articular arteries of the knee; that the Femoral Artery being hurt in the middle of the thigh, the profunda will, through its lower branches nouriſh the leg; and that the External Iliac Artery being wounded even at the groin, the arteries within the pelvis will preſs their blood upon the upper branches of the Profunda, ſo that in like manner, thoſe upper branches of the Profunda ſhall nouriſh the thigh.

It is ſtrange, I ſay, that ſurgeons ſhould have continued merely talking about this artery, or making experiments upon animals, more idle than even the mere conjecture and common report. The great Veſalius

ſcarcely knew the Profunda; we ſee it indeed in his plate, but we ſee it only becauſe we know it, for though it is marked (ψ. χ.) and though it is ſeen inoſculating with the arteries of the pelvis, it is neither drawn truly nor well explained. But ſtill Veſalius obſerves a very large anaſtomoſes with the thyriod artery, marked (ω). Vid. "Integra totius magnæ arteriæ delineatio."—Yet Veſalius's drawing, or plan rather, is much worſe than that of Euſtachius; for in Euſtachius's 15th Table, though we find the Profunda marked it is not characterized with any of thoſe inoſculations, which give it its chief importance in the eye of the ſurgeon: nor is it deſcribed at all even in the explanations of the careful Albinus, who ſhould have put down T. figure 15, as the great "Arteria and Vena Profunda femoris," going down together into the fleſh of the thigh. In Verhein, again, this artery is repreſented; it has its true proportions to the great Arterial Trunk, but it is repreſented as one long and ſimple branch, not having that importance, nor thoſe wide inoſculations, which conſtitute its chief character.——Next comes Heiſter, who blames all former authours, Verhein excepted, for having forgotten this important branch, which after all, ſays Heiſter, "is not ſo very rare *."

* "Huic tanto magis miror, quod multi magni anatomici nullum prorſus mentionem facerint: cum tamen non ſit adeo rarus," p. 142. "Fere omnes anatomici, Verheyeneo excepto, unicum tantum truncum et arteriæ cruralis et brachialis delinearunt, ut videre eſt in Euſtachii, Veſalii, imo et in recentioribus præſtantiſſimis anatomicis, Cowpero ſcilicet," p. 149. Let any man, who knows what the Profunda ſhould be, look to Cowper's third Table in his Appendix to Bidloo,

But it may indeed be ſaid, that all authors knew it, while Heiſter was ignorant of it, a paradox which is eaſily proved; for Veſalius, Euſtachius, Verhein, Cowper, all marked it very diſtinctly, ſome with more, and ſome with leſs accuracy; yet as their drawings were intended as plans of the arterial ſyſtem, it is implied of courſe, ſince they did draw it at all, that they underſtood it to be a regular and conſtant artery; while Heiſter knew it only as an accidental artery. Heiſter began a miſtake, which did not end with himſelf; and which muſt have produced much confuſion and apprehenſion in the ſurgeon's mind; for having cured a ſhoemaker, who in dropping his paring knife, had ſtruck his knees together to catch it, and wounded the Femoral Arterry, Heiſter explains his opinion of the caſe, in the following terms: "If there be only one arterial trunk in this limb, as often happens, neither the compreſs nor ligature, nor any thing but amputation, can ſave the patient's life. The limb muſt fall into abſolute gangrene *." And ſo his conſultation proceeds in theſe terms.

and he will there find the drawing of the Profunda, marked 70, nearly perfect, at leaſt as good and as diſtinct as any other artery in his great plan of the aorta, and more correct than Verhein's. This much is allowable in favour of our great Engliſh ſurgeon, who has been enough accuſed. Vid. Gulielmus Cowper, citatus coram tribunale Nobiliſſ. Ampliſſ. Societatis Britann. Regnæ.

* Imo, ſi forte non niſi unicus arteriæ cruralis truncus hoc in femore adeſſet; ſicut ſæpe obſervari ſolet, ſubinde ne ligatura quidem arteriæ læſæ ad ſanandum hoc malum ſufficeret, quia tunc partes infra ligaturam poſitæ, ob ſanguinis arterioſi hac ipſa ſublatum influxum ſphacelo corripi ſolent, ita ut æger tunc ſine ablato crure ſummoque vitæ diſcrimine ſervari non poſſit.

——Firſt, To try what can be done by a compreſs and bandage; as if he had believed it poſſible to heal the artery, whereas, compreſſion, whenever it ſuppreſſes bleeding, muſt do ſo by obliterating the cavity of the wounded artery. Next, He adviſes, if the compreſs do not ſuffice, then to open up the wound, and tie the artery; and, as if the tying of the artery obliterated the trunk more fairly than the compreſs; he adds, "But if, having tied the artery, there ſhould chance to be but one great trunk;" "Imo, ſi forte non niſi unicus arteriæ truncus adeſſet," the leg muſt be cut off; otherwiſe the leg will mortify, and the patient muſt die.

And Heiſter not only explains himſelf thus upon an occaſion, in which he was particularly intereſted to underſtand the Femoral Artery thoroughly; but he adds to his practical obſervation, and to his undigeſted criticiſms of Veſalius, Euſtachius, and Cowper, a hiſtory of the Femoral Artery, worſe in all reſpects than that of any anatomiſt who had gone before him; for he ſays: ——"The Crural or Femoral Artery moſt commonly deſcends through the whole thigh, quite to the knee, in one ſingle trunk, giving only very trifling branches to the great muſcles of the thigh to nouriſh them," p. 141. —"But nevertheleſs it does ſometimes divide in the upper part of the thigh into two great arteries*."

* "Deſcendit arteria cruralis ſeu femoralis unico tantum plerumque "trunco, per femur totum uſque infra genu, et utplurimum tantum "minores ramulos ad muſculos vicinos prægrandes nutriendos ſpargit," p. 141.

Interea tamen ſubinde in ſuprema fæmoris parte, in duos magnos quaſi truncos ſe dividit, p. 142.

It is from notions like theſe that Heiſter allows himſelf to ſay, "If in this caſe, (as often happens), there ſhould be one great trunk only;" when in fact, it were as difficult to find a thigh without a Profunda, as without a Femoral Artery.

But this miſtake of Heiſter did not end with himſelf: there is another ſurgeon of the preſent day, who is guilty of calling this a luſus naturæ, and of comparing it, like Heiſter, with the high forking of the Humeral Artery.—Mr Gooch miſtakes this Profunda, calls it an accidental branch, a luſus naturæ, an accident ſimilar to the high forking of the Humeral Artery; he does not indeed clench it with Heiſter's direct affirmation, "Scilicet ſæpe obſervari ſolet;" but he writes a paper in the Philoſophical Tranſactions, to inform the world of this intereſting diſcovery, That he had ſeen three times a double artery in the thigh. The terms in which Mr Gooch deſcribes this diſcovery, which he made while performing an amputation, and which he thought might turn out ſo intereſting in conſultations about aneuriſms of the thigh, are theſe:

"In this amputation we obſerved a diviſion of the Femoral Artery into two trunks of equal ſize running parallel. And ſo near together as that we could conveniently include them in one ligature with the needle, avoiding the nerve, after raiſing them up with the diſſecting forceps by a ſmall portion of the connecting cellular membrane; and here we found no occaſion to take up any other veſſel." Philoſ. Tranſ. An.

1775.—His amputation was particular only in this, that he had cut the thigh higher than uſual.—" The two great trunks lying parallel, and equal in ſize to each other," were the Femoral Artery and the Profunda, and where he tied in one great ligature, both the Femoral Artery and the Profunda, there was no great wonder that he found no other bleeding arteries. Theſe are the only peculiarities that I can ſee in this amputation, and I dare ſay, his other amputations were very like this. When ſuch an author proceeds, in the next part of his paper, to retail to us his experiments made (with the help of a famous Farrier) upon horſes and dogs, it is very allowable to ſay, that ſuch experiments were more idle than even the mere conjecture and common report. And ſurely, when ſurgeons three years ago*, could venture to tie the Femoral Artery ſupported by no better hopes than this; we, knowing the Profunda, and all its connections with other

* The celebrated Profeſſor Murray ſays, " I never could find this ſame double artery in the thigh, which Gooch pretends to have found three times, and believes to occur very often." " Nec unquam mihi arteriam femoralem ſuperficialem duplicam videre licuit, qualem celeber, Gooch ſe ter obſervaſſe contendit," &c. p. 44. No wonder that Murray never found any ſuch thing, for Murray knew what the Profunda was, and perhaps was not ſo well acquainted with the Engliſh language, as to underſtand that Mr Gooch was calling the arteria profunda, a luſus naturæ, a double Femoral Artery, &c. and was looking out for it in horſes and dogs. That Gooch did not know the Profunda, is plain from this, that he never once mentions it in his Surgery, nor in his Royal Society paper. Mr Gooch's opinion, and indeed his experiments, are repeated in that edition of his Surgery, which was publiſhed in 1792.

veſſels as we do now, ſhould be very bold in tying the artery very freely, not only in the thigh, but even in the groin.

But the proof of this muſt be wrought up to a greater degree of certainty, for it reſts upon two points, the reaſoning from anatomy, and the final authority of facts; and however ſtrong our perſuaſion might be, that the patient would recover, though the main artery of the thigh were tied; yet until we abſolutely ſee one patient at leaſt recover from ſuch an accident, our opinion is ſtill little removed from that vulgar notion, which is implied in ſuch expreſſions as theſe; "We reſolved to try whether the limb might not be nouriſhed by the inoſculating arteries." This heſitating timorous language is uſed even at this day, when we have the moſt certain proofs of this very intereſting fact; for it has been tried, and it has ſucceeded alſo, to a degree which our reaſoning from anatomy could hardly have led us to expect.

The operation for aneuriſm of the ham, or aneuriſm in the middle of the thigh, never fails from want of a free circulation; though, no doubt, it often does fail from another cauſe, for ſo great an Artery is not eaſily commanded; it is not compreſſion nor even ligature, that will always do; and this great artery often burſts out. Many patients have died ſuddenly in the night, many alſo have died of ſucceſſive bleedings, which the ſurgeon could neither prevent nor ſuppreſs; while death from gangrene has been extremely rare.

I think I am ſafe in ſaying, that in all caſes where our ligatures can command the artery, our patient is ſafe;

which is tantamount to ſaying, that wherever we can force the blood towards the inoſculating arteries, they enlarge: and operations for popliteal and femoral aneuriſms, for aneuriſms in the ham and thigh, have ſucceeded ſo often, both in recent accidents, and in old diſeaſes, that on this point, we need have no fear; I need not labour to prove to you a thing ſo generally known. But it is of importance towards giving you confidence in all accidents and difficulties, that I explain to you how poſſible it is to tie the artery in the groin, and ſave the limb; an argument which I enter upon the more willingly, as it includes, à fortiori, the doctrine of all lower wounds.

When we obſerve the free inoſculations of the Profunda, with the articular arteries of the knee, we are encouraged to tie the Femoral Artery anywhere below the root of the Profunda; and ſeeing that it is the Profunda which ſaves the limb, we tie the artery in the thigh, as freely as in the ham. We are encouraged by theſe ſlender inoſculations round the knee joint, to tie the artery anywhere below the giving off of the Profunda, and when we compare with theſe, the high inoſculations formed by the upper branches of the ſame Profunda, aſcending and encircling the more fleſhy joint of the hip, we need not want courage alſo, to tie the artery in the groin. Theſe upper inoſculations, belong to an order of arteries large in proportion to the limb they nouriſh; juſt as the arteries of the knee are delicate, in proportion to the ſmallneſs of the leg; and I am perſuaded, that in good time, the accidents of practice, and the boldneſs of the ſurgeon, will

make our apprehenſions about ſucceſs in this caſe appear as childiſh as the notions of the older ſurgeons, who had their amputation inſtruments in good order, whenever they ventured to operate for aneuriſm in the arm.

Guattani was called to attend a young man, who had an aneuriſm of the Iliac Artery, at firſt ſmall and limited to the groin, lying cloſe up under the ligament of the thigh, ſeeming indeed to come from within the pelvis. But ſoon after Guattani had begun to apply his compreſſes, (viz. in one month after), and while the tumor ſeemed yielding to the compreſſion, it burſt ſuddenly during the night, with intenſe pain, ſo that they were obliged inſtantly to cut the bandages and give him relief; then immediately the blood puſhing forwards among the cellular ſubſtance which ſurrounds the pſoas muſcle, produced ſo ſudden an enlargement of the tumor, that Guattani at next viſit, ſaw that all hopes of a cure were now at an end. In a few days more the tumor filled the whole of the hypochondrium, came plainly from within the pelvis, and going along the groin, extended quite to the middle of the thigh. With this prodigious tumor beating ſtrongly, and filling the thigh and haunch both within and without, the man lingered for three or four weeks, and then died. "This caſe," ſays Guattani, "excited in me a great deſire of inveſtigating the whole courſe of the Femoral Artery;" and in this inquiry, we find Guattani diſcovering and proving more than he himſelf knew of, and much more than the celebrated Murray will allow; for Murray ſays, "although Guattani was able

to inject tepid water, tinged with yellow from the arteries of the pelvis, round into the arteries of the leg and thigh; yet I ſuſpect ſtrongly that the groſſer fluid, the blood, would paſs through the ſame channels more difficultly, nay ſo ſparingly as not to nouriſh the limb *.

But the fact, as it ſtands in Guattani, is this: Firſt, He found by diſſecting, in going carefully along the courſe of the femoral artery, that it was ſtraitened from the groin down to the ham, where it was almoſt obliterated. "I thought, indeed, ſays Guattani, that the Popliteal Artery was abſolutely obliterated, till by examining more carefully, I found that it could juſt receive one of Anell's wires †." Now, ſince Anell's wire is no bigger than a briſtle, may we not ſay that it was obliterated, that no blood paſſed that way, that the limb had lived from the time of the burſting of the aneuriſm, and during the gradual obliteration of its great artery, only by the inoſculations along the back part of the thigh.

Secondly, Guattani found, by the injection of tepid water tinged yellow, that the blood had gone round by the branches of the Gluteal, Sciatic, and Pudic Arteries; that, in ſhort, it had gone round by the arteries

* "Licet enim ex Cel. Guattani experimentis conſtet, aquam colore flaveo tinctam et calefactam, ſi arte in Arteriam Iliacam internam pellitur, arterias femoris larga copia penetrare, hiſque abſciſſis ex minoribus ejus ſurculis abunde defluere; vereor tamen ne liquor craſſior qualis ſanguis eſt, multo difficilius eaſdem pervadet vias, vel latices hujus vitalis portio ægrius tranſmiſſa in ſufficiens prebeat membri nutrimen."

† Sed re accuratius inſpecta, cognovi, tantum in arteria cavi relictum, eſſe ut Anellianum ſpecillum poſſet admittere, quamvis id ægre fieret, &c.

from within the pelvis ſurrounding the hip, into the Tibial and Fibular Arteries below the ham.

This is the moſt ſingular fact in the whole pathology of aneuriſms; for the blood which had nouriſhed this limb had moved not only through the common inoſculations round the hip joint, but it had gone by the moſt circuitous courſe, and to finiſh its circle, the blood muſt have paſſed through three ſeries of inoſculating veſſels: Thus, the blood came not from the upper inoſculations of the Profunda into the trunk of the Profunda, and ſo round the haunch by a ſhort circle, into the great artery of the thigh, but muſt have proceeded firſt through the Gluteal and other Arteries of the Pelvis into the Articular Arteries of the hip; then from the Articular Arteries of the hip into the Profunda, which is their parent trunk; then it had gone down from the main trunk of the Profunda along thoſe lower branches of the Profunda, which are named its Perforating arteries; then from theſe the lower extremities of the Profunda it had paſſed into the Articular Arteries of the knee, and by this laſt inoſculation the blood once more had acceſs to the trunk, *viz.* to the Popliteal Artery, where it divides into arteries for the leg. In ſhort, it had happened in this caſe, as muſt always happen, that the ſmaller arteries grew ſtronger in both functions at once, *i. e.* that the arteries turning round the hip were both ſo much increaſed in ſize as to be able to carry a ſufficient quantity of blood for nouriſhing the thigh; and their inoſculating extremities alſo were enlarged in like proportion, ſo as to tranſmit a ſufficient quantity of blood for nou-

riſhing the leg. The blood had paſſed all along by theſe veſſels which lie upon the back part of the thigh, leaving the Proper Femoral Artery dry of blood, and almoſt cloſed all the way from the groin, or rather from within the pelvis, down to the ham; and I call upon Murray, with all his knowledge of the blood-veſſels (and no other man knows ſo much about them as he does), to point out any other paſſage for that blood by which the limb continued to live.

Another thing alſo deſerves notice in this very intereſting caſe, *viz.* that in their natural and undilated condition, the arteries round the haunch will not tranſmit the blood thus freely, even through one inoſculation, much leſs through three ſucceeding ſeries of inoſculating arteries; and this circulation of the yellow water uſed by Guattani was thus free, merely on account of the gradual dilatation of the arteries in this diſordered limb: For Guattani after this made an experiment upon the arteries of a ſound limb *, which explains to us how vaſt the difference is betwixt the

* Guattani does not mark the difference betwixt his experiment and his diſſection; but his experiment was this: Firſt, He placed his injecting tube above the Hypogaſtric Artery, then he tied the Femoral Artery in the groin, and threw in his injection, and it went round eaſily into the Profunda Femoris; which he explains by ſaying, "More ſatis copioſe perfluxit." Next, He made another ligature upon the great artery in the ham, imitating the obſtruction in this caſe of aneuriſm, and he forced the injection round in a ſecond inoſculating circle, *viz.* by the Articular Arteries of the knee, where of courſe the injection was a little retarded, but ſtill flowed out indeed, "liquorem ſane effluere conſpexi," but infinitely leſs eaſily, "ſed "longe lentius, parciuſque,"

condition of arteries in an aneurifmal limb, and in a found one *.

Thus, the conclufions are thefe :

1. That a fine injection of coloured water, which will not pafs through the veffels of a found limb, will circulate freely in the dilated veffels of an aneurifmal limb.

2. That not this yellow water only, which Murray fpeaks fo lightly of, but alfo the circulating blood, will pafs freely all the way from the arteries within the pelvis to the artery in the ham; for this leg lived a month after the burfting of the aneurifm, during which time the inofculating arteries continued enlarging and the great trunk contracting, till at laft the trunk was entirely obliterated, and the inofculating branches carried all the circulating blood.

3. That we are fafe not only in tying the artery in the thigh, but in tying it in the groin; for in this cafe the blood came down by the back part of the limb. The arteries were obliterated upon the fore part of the limb; yet it was not by gangrene of the limb that this patient died.

It is not from my being limited to this fingle cafe, that I here prefs the point fo ftrongly; I do this only to make it clear, while I have many other cafes in

* My friend, Mr. Harknefs, cut off the thigh of a very big and ftrong man, on account of an aneurifm of the Femoral Artery complicated with a fracture of the thigh-bone; and although the blood had been interrupted only for three weeks, he needed to take up twelve great arteries with the needle, and ftill left the ftump bleeding at every point.

reſerve, which will perhaps prove the point as fairly. For example, when the celebrated Heiſter laid a large compreſs upon the wound of the Femoral Artery; and laid a ſucceſſion of firm compreſſes along all the courſe of the artery from the wounded part, quite up to the groin*; when he bound theſe compreſſes by the tighteſt rollers, drawn with all his ſtrength; when he continued a compreſſion which ſuppreſſed the bleeding from a wounded Femoral Artery for three weeks; what did he do? Is it to be ſuppoſed, that theſe large compreſſes, merely ſuppreſſed the ſtronger action of the artery, and kept its wounded lips in contact, till they healed? Surely not; no one who has ever ſeen the lips of a wounded artery will expect ſuch a cure: for the lips of a wounded artery are ſo callous, and ſo turned away from each other, that the wound of an artery, ſtruck even with a keen lancet, reſembles (as the celebrated Monro, the father, obſerves, in deſcribing an aneuriſm of the arm), rather a round hole ſtruck with a punch. When Heiſter applied his compreſs and bandages ſo as to ſuppreſs the bleeding, ſurely he compreſſed the artery! When he compreſſed the artery, ſurely he put its ſides together! When he obliterated thus the canal of the artery, the force of the blood fell upon the inoſculating branches, and they would ſoon enlarge to ſuch a degree, as to carry freely all the circulating blood. The circulating blood would no longer ſeek the main trunk of the artery, which therefore

* This was Heiſter's contrivance for ſuppreſſing the bleeding in the caſe of the Shoemaker.

would contract by being empty ; and its walls would adhere at that point where it was particularly compreſſed : Heiſter's cure by compreſſion, would reſemble, in all eſſential points, the cure by ligature ; in this only it would differ, that beſides being tedious, painful, uncertain, the cure by compreſſion would obliterate both trunk and branch; for ſince the Profunda lies directly behind the Femoral Artery betwixt the compreſs and the bone, againſt which the artery is compreſſed, the compreſſes would obliterate the Profunda, as well as the Femoral Artery, leaving nothing to ſupport the limb, but that ſeries of inoſculating arteries running along the back part of the thigh ; the value of which I have juſt explained. In ſhort, the Profunda lying ſo directly behind the Femoral Artery, as to be taken up by Gooch in the ſame ligature, may very reaſonably be ſuppoſed to be affected by the ſame broad compreſs which covers the Femoral Artery.

But there is alſo another phenomenon in diſeaſes of the Femoral Arteries, which is very intereſting, and which proves this point completely ; for independently of operations by ligature or compreſſion, we have evidence in the natural cures, (as ſometimes nature herſelf performs the cure,) that the Profunda may be cut off together with the Femoral Artery, and yet the limb be preſerved. We ſee, for example, a great aneuriſmal tumor of the groin, we ſee it increaſing rapidly till the ſkin threatens to fall into gangrene, and we are for ſome days waiting in great anxiety and fear, for that laſt change, in which the ſkin is to burſt, and the patienr to expire with one ſudden guſh of blood.

Then the fever begins, the beating of the tumor ceaſes, the ſkin becomes livid, the whole limb is cold and without pulſe, every thing ſeems to foretel an inſtant gangrene. But theſe which are ſo often the mortal ſigns of gangrene in the whole limb, are ſometimes rather the preſages of a happy cure; for either the clotted blood has ſo accumulated, or in the natural aneuriſm, (*viz.* that proceeding from a dilatation only of the artery), the looſer coagula have ſo fallen down from the walls of the aneuriſmal bag into the main channel of the artery, as to ſtop the circulation from the groin downwards, in both the arteries of the thigh. Such obſtructions turn aſide the current of the circulation, new channels are found for the blood, and as it begins to flow more freely in theſe, the pulſe, the heat, the feeling of the limb, are all gradually reſtored; they are perfect in a few days, the patient awakens from the low delirium which accompanied the firſt alarming ſigns, and not only his life is ſafe, but in a little while, his limb alſo is perfectly reſtored*.

Nay, a thing ſtill more ſingular has happened, very nearly the ſame proceſs has performed the cure; with this variety, that during this natural cure, the tumor burſting, has laid the limb ſo open, that the ſurgeon has (if we may be allowed the expreſſion) been able to look into the limb, and ſee how the veſſels were affected from the groin quite down to the ham. "A

* Caſes of this nature, may be ſeen in the London Medical Journal, by Mr Joart Simmons, in the Medical and Surgical Tranſactions, and in other collections.

young man having an aneuriſm of about three weeks old in the groin, it grew in a ſhort time to ſuch a ſize, that after giving him excruciating pain, it burſt inwardly, upon which the tumor flattened and extended downwards towards the hip; with relief of pain and increaſe of the œdema, which had for ſome time affected the leg. The leg now cold and motionleſs, was in danger of preſent gangrene; but in forty-eight hours, the limb ſeemed to recover, the œdema leſſened, the tumor burſt irregularly about the groin, and diſcharged its contents, partly a thin ſanies, partly clotted blood. In eight days, the whole tumor, or in other words, the whole thigh, fell into ſuch gangrenous ſuppuration, that it lay entirely open. The Sartorius, Pectinalis, Triceps, and all the muſcles of the thigh were naked, and as if diſſected. In the bottom of this great triangular hollow, lay the inſertion of the Pſoas Magnus alſo bare*. This gangrene of courſe penetrated quite to the Inner Trochanter of the thigh bone, and laid open all that part of the thigh, in which the nerves and great veſſels lie. This triangular cavity, extended from the ligament of the thigh to that part of the triceps at which the vein and artery paſs from the fore to the back part of the thigh, and in all that ſpace, nothing was to be ſeen but the muſcles clean ſeparated, or diſſected as it were,

* Hinc factum eſt, mſculis, Pectineo, Iliaco, atque Pſoas parte infera, ſartorio, anteriori, denique tricipitis portione, denudatis, et a putredine vindicatis, triangularem alveum, poſtremis hiſce geminis præcipue intercluſum, ab inguinis ligamento ad ſedem uſque, qua decuſſatim implicantur, vaſis, nerviſque cruralibus in eodem alveo excurrentibus, a putredine penitus deſtructis, expoliatum rubentemque apparuiſſe —GUATTANI.

by the gangrene. The great nerve, vein, and artery were entirely gone; nay further, the ſurgeon, the celebrated Petro Javina, was obliged to puſh his finger up under the ligament of the thigh, and to make an inciſion there, that the matter from within the pelvis might come down more freely. It is not wonderful that the patient lying in this moſt miſerable condition died ſlowly, waſted by his diſeaſe.

There needs no experiment of injecting yellow water, to explain to us what had happened in this caſe. That the patient lived one month after the burſting of his aneuriſm, the thigh lying open all the while, is ſufficient proof that the limb was nouriſhed; and ſuch a limb having lived, ſatisfies us alſo, that the thigh may ſurvive after the Femoral Artery is interrupted, after the Profunda alſo is cut off along with the Femoral Artery, and alſo after the common Iliac Artery is burſt abſolutely within the pelvis. But in juſtice to this intereſting ſubject, I muſt lay before you one caſe more, which I am induced to do for two reaſons; in the firſt place, the caſe is perfect, the patient having lived;—and, in the next place, I have but to preſent the caſe to you in a fair tranſlation, the chief accidents of it are already explained; and if you reaſon for yourſelves as I have argued on the other caſes, you will find it clearly proved, that in the following caſes cured by the celebrated Guatrani, not only the Profunda was compreſſed along with the Femoral Artery, but that the External Iliac was ſo compreſſed alſo at the paſſage from under Poupart's

ligament, that every artery on the fore part of the thigh, was ſtopped.

"A goldſmith of the name of Morellus, fifty-five years of age, conſulted Guattani about opening a tumor in the groin, which all the other ſurgeons declared, had come to a perfect ſuppuration. Morellus had, during the whole winter, complained of a ſettled pain in the right groin, ſometimes milder, ſometimes very violent, but never abſent, accompanied during the winter only with a degree of lameneſs, but now in the ſpring it had begun to ſwell. When this unlucky Morellus, going along with others, on the 4th of June, to Saint Peter's, to ſee the pompous ceremony of the conſecration of the hoſt, was ſeized ſuddenly with ſuch dreadful pain, that he was obliged to go home, and partly from fear, partly from the violence of the pain, went to bed and lay for three months under the care of his phyſicians, their preſcriptions all ineffectual, his diſeaſe increaſing daily; and the unfortunate Morellus now almoſt hectic, was entirely confined to bed. There was great ſwelling of the groin, contraction of the thigh, (ſo that he could not ſtretch it out), and a diſtinct fluctuation of the groin, which extended from the Symphiſis Pubis to the ſpine of the Ilium, but ſtill without tenſion or pain; but, on the contrary, the fluid fluctuated freely, and ſeemed to be immediately under the ſkin.

Guattani could not allow himſelf to believe this to be a proper ſuppuration, becauſe the fluctuation brought no relief; and though there was no pulſation, he yet ſuſpected aneuriſm, and explaining himſelf on

this head to the conſulting phyſician and ſurgeon, Amicio and Maximinus, both profeſſors in Rome. They agreed to ſpend a few days longer in trying common remedies, partly that they might make a trial of ſuch remedies, but chiefly to allow time for Guattani to make up his mind concerning the nature of this diſeaſe.

After fifteen days, they found no change, except a new ſuppuration within four fingers breadth of the great trochanter, and, therefore, reſolved to do the operation, and to cut in the groin as the place the moſt favourable for ſtopping the flux of blood, in caſe of Guattani's fears about aneuriſm being well founded.

But leſt the aſſiſtants or friends, and more eſpecially the patient himſelf ſhould be alarmed with the ſight of blood, Guattani talked over this ſubject with the patient, aſſured him that he had provided every thing for ſtopping the blood, explaining to him at the ſame time, how eaſy it would be to enlarge his ſmall inciſion, in caſe of there being pus only in the tumor, and explaining alſo, that in caſe of pure blood flowing, he would preſently give it a free exit, ſo as at leaſt to empty the bag, and would let the freſh blood run ſtill, even after the emptying of the bag, if his ſtrength would bear it. After which, he pledged himſelf to ſecure the artery by compreſſion, if he could only get his compreſs fairly put down upon the artery itſelf. After all this, ſays Guattani, I truſt there will come on a good ſuppuration, and that you will be reſtored to perfect health; at all events this is

expreſsly what muſt be done, and all that can be done to attain that deſirable end."

"Morellus heard me," ſays Guattani, "with a compoſed mind, and we proceeded to our operation boldly; being provided with baſons for receiving the matter, and compreſſes and bandages for commanding the blood. Then the ſurgeon Maximinus introduced his curved biſtoury delicately into the higheſt point of the tumor, near the Criſta Ilii where the ſkin was particularly thin, when inſtantly pure blood guſhed violently out, to the great alarm of all preſent. But encouraging the patient, I took one of the baſons, ſays Guattani, in my own hand, and extracted ſuch quantities of blood by this ſmall opening that I filled one baſon, took up a ſecond, and ſtill continued my work, till the pure arterial blood began to flow, and the patient to faint." The blood was ſtopped by Maximinus clapping his thumb upon the orifice: and Guattani, by graduated compreſs one above another, with firm bandages, ſo ſuppreſſed the bleeding, that the patient did not faint, but, on the contrary, was preſently relieved from all his fever and pain; and being ſupported with cordials from time to time, he went on without either bleeding or any other bad ſymptom, and without their needing to touch the bandage till the 13th day, when the dreſſings being removed, nothing flowed from the wound but a little pus; which ſhowed that the artery was fairly cloſed, and encouraged them to go on with the cure. Although the ſuppuration was not exceſſive, they were forced to make a counter-opening, and accompliſhed

the cure in little more than two months.—Now the coagulated blood at firſt, and the freſh blood after, the patient's feeling no lowneſs during the emptying of the bag, and his fainting when the pure blood began to run, prove this to have been an aneuriſm, and Guattani did wiſely in allowing ſome of the arterial blood to eſcape, that he might have a greater command of the artery, and be enabled to compreſs it.

Now, it ſignifies nothing to the point, whether this was or was not an aneuriſm; nor, if it were truly an aneuriſm, does it ſignify whether it were an aneuriſm of a branch only, or of the main artery of the thigh; nor whether the aneuriſm were above or below that point at which the Profunda goes off. The queſtion is, Whether the main artery was ſtopped above the Profunda by the violent compreſſion which they needed to make? And this is ſolved by Guattani's reflections upon the caſe, which are theſe two only.

"This caſe ſettles, ſays Guattani, two great queſtions which diſturbed me very much; for in the firſt place, the preſſure was ſuch as to prevent the leaſt drop of blood from paſſing down the artery; whence I was ſatisfied that the limb was nouriſhed by the Internal Iliac Artery alone; and ſince this aneuriſm was cured by compreſſion merely, I am ſatisfied that compreſſion will cure any aneuriſm, whether from wounds or from diſeaſe."

The ſtrong concluſions of this caſe alſo the celebrated Murray tries to eſcape, by ſaying, "Vero ſimile videtur, Arteriam Femoralem ſupra inguen jam

diviſam fuiſſe, nam alioquin, toto trunco compreſſo, vix auſa tam fortunate ceſſiſſent." But far from its being likely that the Femoral Artery divided above the groin, it is impoſſible for the Femoral Artery to have divided within the pelvis into two arteries deſtined for the thigh. The Iliac Artery does indeed divide within the pelvis into two arteries, but they are natural ones, *viz.* the Hypogaſtric Artery, going from within the pelvis to ſupply the hip; and the Femoral Artery, deſcending along the thigh.

Thus you perceive, that this queſtion, whether to tie the Femoral Artery in the groin or to cut off the thigh, is a matter of ſerious importance; that there are everywhere proofs of its ſafety, if we will but ſeek them out; that there are every where doubts alſo about the ſafety of it in the books of the beſt authors, (for among the beſt authors the celebrated Murray muſt rank very high): But upon theſe proofs and reaſonings I think my concluſion ſtands firm; that though our ligatures will not always hold; though it is never eaſy to command ſo large an artery as the Femoral Artery at the groin; though ſucceſſive inflammations and the deep driving of blood will often hurt the inoſculations, and prevent our ſucceſs, yet ſome have been abſolutely cured by tying the Femoral Artery at the groin, and the bodies of thoſe who have died have proved how poſſible it was to have made a cure, and that in this, as in other aneuriſms, the difficulty is not that nature, on her part, has failed to provide ſufficient inoſculations, but that the ſurgeon cannot, on his part, ſecure the great artery, ſo as to obliterate its canal and make its internal ſurfaces adhere.

The ſurgery of the other great arterial trunk, *viz.* the artery of the arm, ſtands preciſely in the ſame circumſtances, *i. e.* its inoſculations are perfect, and yet they are not known; for the rule of practice which directs us in wounds of the Femoral Artery to cut off the thigh, concludes commonly with a more violent declaration concerning the danger from wounds of the Axillary Artery: "But if the Brachial Artery be wounded near the Axilla, or if the Axillary Artery itſelf be wounded, it is neceſſary to take off the limb at the joint."

If a man will look only ſuperficially on theſe matters, or will be ſatisficd with a general concluſion deduced from the accidents only of one particular caſe, then indeed he will be hurried along into this raſh practice of cutting off arms as well as legs: Or in other words, if to eſtabliſh this rule of ſurgery, nothing more were required than an authentic caſe of a wounded Axillary Artery followed by gangrene and death, ſuch proofs might be found in every common book. Thus Mr. Gooch tells us, p. 76. "That he was called by a neighbouring ſurgeon to attend along with him a man who had been juſt before, in a ſtate of exceſſive intoxication, thrown from his cart, the wheels of which had paſſed over the top of his arm and ſhoulder, bruiſing all the parts quite up to his neck, while an iron hoop projecting from the cart had cut him under the arm, tearing fairly acroſs the artery and all the great nerves which go down along the arm."

"The limb was wholly deprived of ſenſation and motion, they felt no pulſe at the wriſt, and they conclud-

ed that the Brachial Artery was divided, although the bleeding, which was at firſt profuſe, had ſtopped, partly by the retraction of the artery, and partly by their having tied down his arm to his ſide."

" Had not the druken condition of the patient and the violent contuſion of the parts ſurrounding the joint diſcouraged us, ſays Gooch, we ſhould have propoſed immediate amputation at the joint. The next morning the arm appeared in different parts diſcoloured, emphyſematous and gangrenous; by noon it was totally dead and inſenſible to the finger ends; and on the third day towards the evening the patient expired. The day after his death, the arm was ſo thoroughly putrid that we were unable to diſſect it, till after having waſhed it well with warm vinegar and ſpirits, we opened it, and found the bundle of the great nerves entirely cut acroſs, and the artery alſo divided and its upper end retracted an inch into the Axilla."—But this, far from being a general proof, is an accident merely: It is explained by the general circumſtances of the caſe; the inebriation of the patient, his loſs of blood, the cutting of the whole bundle of the Axillary Nerves, are of themſelves ſufficient to account for his death. Perhaps he died as Captain M—— did, whoſe caſe is related by the celebrated Mr. White, rather from his inebriation, loſs of blood, and wounded nerves, than from the neceſſary conſequences of his wound. Captain M——'s arm preſerved its circulation; the natural heat had returned; the vein ſwelled upon putting a ligature round the the arm, and he died after the arm was ſafe from all danger of gangrene.

But this caſe, related by Mr. Gooch, was complicated with other accidents; for we are told that they were deterred from amputation, by the bruiſed condition of the parts ſurrounding the joint. The wheel had paſſed along the arm and ſhoulder quite up to the neck; theſe parts were black; and I dare ſay, little better than gangrenous: It is no wonder then, that an arm ſo mangled, upon a body ſo hurt and diſordered, fell into immediate gangrene.

Hence we ſee the folly of deducing any general concluſion from an individual caſe, and we are thus further reminded of this good rule in philoſophy, that one poſitive evidence muſt outweigh any number of negative proofs. If we can find one ſingle example of an Axillary Artery wounded, and the arm ſaved; it is then a ſettled point, that in favourable circumſtances the inoſculating arteries round the ſhoulder will ſave the arm; and the concluſion ſtands ſo firm, that though there ſhould be produced againſt that ſingle recovery a whole hoſt of negative proofs, it evidently becomes our duty, whenever we are preſented with ſuch a caſe ſeeming to contradict this poſitive proof, to ſearch into the circumſtances and accidents which have made that one caſe fail, while another has been followed by ſuch perfect ſucceſs. As the pureſt caſe, the leaſt complicated, and the moſt unequivocal example of this ſucceſs, I put down the following:

"About ſixty years ago, Mr. Hall was called to a man in Cheſhire, who had received a very conſiderable wound, juſt below the Axilla, by a ſcythe which had divided the Brachial Artery. The man ſoon

fainted away with the loſs of blood, which preſerved his life, as no body was near him. Mr. Hall, being only accidentally in the neighbourhood, had no needles with him; but as ſoon as he arrived, he eaſily laid hold of the artery with his finger and thumb, till he could procure ſome thread, which he immediately tied round the veſſel, and effectually ſecured it. The *man recovered the uſe of his arm;* though he had ever after a weak and trembling pulſe *."

It was the broadneſs and openneſs of this wound, that enabled the ſurgeon to ſee the bleeding artery, and to take it up ſo fairly, as to ſave at once, both the life and the limb of the patient; for in many other caſes, it has only been by conſenting to loſe the limb, that the patient has ſaved his life; or where the limb has been ſaved from amputation, it has in general hung lifeleſs, and like a piece of mummy by his ſide.

If it were worth while, I ſhould be careful to explain the chief accidents of this kind, ſo as to prove the following poſitions: That the wound of the Axillary is leſs dangerous ſtill, than wounds of the Femoral Artery: That when gangrene has ſeemed to proceed from a wound of the Axillary Artery, it has been owing rather to the complications and accidents of the caſe: That when together with a wound of the artery, the bones are fractured, or the ſoft parts bruiſed, as with a waggon wheel, the cure will be almoſt impoſſible, and the parts muſt fall into gangrene: That where, by the force of the artery driving the

* Vid. White's caſe of Captain Mounſey.

blood inwards, the Cellular Subſtance and the interſtices of the muſcles are filled, or, as I may ſay, rather injected with blood, there we ſhall have a ſlow and tedious cure; that if the inoſculating arteries be torn by a lacerated wound, or their circulation diſordered and interrupted by a high inflammation and ſwelling of the parts, this alſo will make a very doubtful caſe, in theſe circumſtances alſo, it muſt be dangerous to attempt the cure. But all theſe do not belong to the general queſtion; they are merely the peculiarities of the caſe; they are the very points to be debated in any great conſulation; but they are not arguments for a general rule. Let, therefore, the ſurgeon do as he ſees prudent in caſes of wounded arteries, with lacerated wounds, broken bones, a diſordered ſyſtem, a weakly habit of body; but on account of a ſimple wound of the great artery, he ſhould not allow himſelf even to talk of the amputation of the limb.

Although I am ſatisfied that I have explained to you the true grounds of this rule of practice, yet I ſhould feel as if there were ſomething imperfect in the proof, unleſs I ſaid alſo here, as I did in ſpeaking of the lower extremity, a few words about the inoſculating arteries. The arteries which go round the joint of the ſhoulder, may be very properly compared with thoſe which belong to the hip joint; the one ſet of arteries goes round the Scapula, as the other goes round the haunch bone, and the one is as well able as the other, by free inoſculations, to ſupply the limb below. Firſt one great artery comes from within the

cheſt, paſſes tranſverſely acroſs the root of the neck, croſſes over the ſhoulder, and going down over the Scapula, ſhould be named the SUPRA-SCAPULAR Artery, and is one upon which we may chiefly rely *. Secondly, Other great branches come off from the artery without the cheſt, from the deepeſt part of the Axillary Artery, where it lies high up in the axilla. Theſe as they turn over the lower part of the Scapula, ſhould be named the SUBSCAPULAR Arteries, and they have free inoſculations with thoſe above. The third great artery coming off from the general trunk of the humeral artery, is a great muſcular branch, which runs down along all the back part of the arm; belongs chiefly to the muſcles and (like the muſcular artery of the thigh), this alſo is named PROFUNDA. And whether the great artery be wounded juſt where it comes from under the clavicle, *i. e.* betwixt that great branch which goes over the Scapula and that which goes round the Scapula from below; or whether it be wounded betwixt the lower Scapular Artery and the *Profunda*, ſtill the limb is ſafe; we are aſſured of it by caſes; we foreſee the ſucceſs of all ſuch

* This artery is regular, as far as relates to the Scapula, but in its origin it it quite irregular. This great artery, going over the Scapula, named Supra-Scapular artery or Arteria Dorſalis Scapulæ, moſt commonly comes from within the cheſt, being the firſt great branch of the THYROID ARTERY; ſometimes it proceeds from the CERVICALIS, or artery of the neck; ſometimes it comes off upon the outſide of the cheſt; it makes large inoſculations, and is the branch particularly to be depended upon; but all the Cervical Arteries aſſiſt with their leſſer inoſculations, and all of them, or any one of them, may be ſo enlarged as to perform this office.

operations by the ſucceſs of our injections; I have often found that when even in the oldeſt ſubjects, I have puſhed injection (of the coarſeſt kind), from the arch of the aorta, trying to ſave the arteries of the arm for a ſecond injection, by tying both arteries in the axilla very ſecurely, I have notwithſtanding had an injection of the arteries of the arm; ſometimes in both arms, more frequently only in one; but even one experiment of the kind, and one arm injected, were a ſufficient proof.

And you will be inclined to remark this proof as a very ſtrong one, when I inform you that our coarſeſt injection goes thus freely round the inoſculations of the ſhoulder, (where we are ſo much afraid of performing an operation), while even tepid water will not paſs, or will ſcarcely paſs round the inoſculations of the elbow, where in our operations for the common aneuriſm, we are ſo ſure of ſucceſs.

As for the inoſculations in all the lower parts of the arm, no doubts about their ſufficiency trouble us now, although this alſo is a degree of confidence and boldneſs in ſurgery which we have attained very ſlowly.

I have already mentioned, that whenever a ſurgeon ventured to perform the operation for aneuriſm at the bend of the arm, he was careful to have his amputation inſtruments ready, and we find the celebrated Ruiſh ſpeaking of this operation in ſuch terms: "This is an operation which ſurgeons choſe rather to deſcribe, than to perform, I have good reaſon to ſay ſo, ſince, for more than 20 years, in all this great city to which ſo many under all kinds of ailments crowd for

aſſiſtance, no ſurgeon, as far as I have heard, has ventured to tie ſo great an artery *."

Heiſter believed, that wherever we cured the aneuriſm of the arm by tying the artery, the arm was ſaved, by a high forking of the artery, and it was only latterly he began to ſuſpect that the ſmaller branches might ſometimes be ſo far enlarged as to carry the blood freely; becauſe he occaſionally obſerved, that after the operation for aneuriſm there was no pulſe in the wriſt during three days, after which it began to be perceived, and ſoon returned to its natural ſtrength †.

" If the Axillary Artery be wounded, ſays Mr. Gooch, it is neceſſary to take the limb off at the joint; yet as there are inſtances of the Brachial Artery dividing into two, ſoon after it leaves the axilla, which luſus naturæ I have obſerved at different diſtances in the arm, it will be rational practice when we feel a

* It is commonly ſaid, that Ruiſh was actually the firſt who had performed this operation in Holland; whereas, the paſſage ſtands thus: " Operationem ſane ab authoribus majus commendatam et " laudatam quam inſtitutam; quod dicere non gravor, quia viginti " abhinc annis, et quod excurrit in hac vaſta civitate, ad quam ſine " numero confluunt afflicti, hanc operationem in arteria adeo ingenti " nullus (quantum noverim) chirurgorum inſtituit," Ruiſh, Vol. 1. Obſerv. 2.

† " Poſſe vero ramulos minores ſe ita ſenſim dilatare, ut §. XXXVIII. " diximus, Clar. Du. Præſes inde ſuſpicatur, quia cum aliquando trun- " cum arteriæ brachialis internum, graviter vulneratum, prædicta ra- " tione ſupra vulnus ope fili circumdicti ligaſſet, intra triduum nul- " lum in arteria juxta carpum poſita, quæ a medicis explorari ſolet, " pulſum ſentire aut percipere potuit; poſthæc vero hanc arteriam, " primo leviſſime micare, ſenſim vero ſenſimque penitus pulſare " ſenſit."

pulſation at the wriſt. to treat ſuch caſe as an aneuriſm, by tying the artery," &c. p. 72.

In ſhort, there were two accidents with which the older ſurgeons encouraged one another to this operation, *viz.* that the artery often forked very high in the Axilla; or ſecondly, that in common an artery touched with the lancet in bleeding, was pricked not in its trunk, but only in one of the two branches into which it divides at the elbow. Thus Cheſſelden ſays, "I had always thought this wound was in the Inferior Cubital (*i. e.* in the Ulnar) Artery, and thus the ſudden reflux of the blood was accounted for, by the communication of the two Cubital Arteries in the palm of the hand, and thus ſatisfied, I inquired no further; though Mr. Sharp, even ſo long ago as when he was my apprentice, told me that the wound was in the trunk, in the Humeral Artery itſelf, as indeed it is," p. 457. And yet the celebrated Dr. William Hunter, notwithſtanding this affirmation of Cheſſelden, lays it down in the moſt formal poſitive manner, in the ſhape of a practical rule or inference, we know not what to call it, marked xv. "That though the Brachial Artery in moſt people divides into its two branches a little below the part where we commonly bleed; yet perhaps it will be found, that the aneuriſm happens oftener to one of the branches, than to the trunk of that artery, becauſe theſe often lie nearer the ſkin, and are thereby more expoſed to injury," p. 353.

This has nothing in it of the uſual correctneſs of Dr. Hunter, for in point of fact it is wrong; the branches do not lie nearer to the ſkin, they are buried deep un-

der the bellies of the pronators and flexors of the arm, and any one may know this, whoever in his life has tied up an arm for bleeding, where he muſt have obſerved the ſtrong beating of the artery only where it was entire, running in one trunk under the Median Baſilic Vein. And his reaſoning is farther wrong than his aſſertion; for if in moſt people the artery divides a little below the place where we bleed, it matters little whether below that point the two branches be ſuperficial or deep, the aneuriſm cannot happen "oftener to one of the branches than to the trunk."

I feel myſelf entitled to ſet up at the concluſion of this diſcourſe, a rule, the very reverſe of that with which it began, and to ſay, that after theſe proofs, the queſtions about inoſculations may be blotted out altogether; that wounds of the Axillary Artery, like wounds of the Femoral Artery, are often dangerous from bleeding, but never fatal from the want of inoſculations; that we ſhould tie the greateſt arteries confidently wherever they are wounded without the trunk of the body, and that we ſhould tie the arteries as boldly at the groin or in the axilla as in the leſſer branches going down the thigh or arm. Accidents undoubtedly (as we are in all our operations at the mercy of accident) may prevent our atchieving a cure; a limb bruiſed with a waggon wheel, or wounded with a great ball, cannot be ſo eaſily ſaved, as when the artery alone is wounded by the ſtab of a knife or ſword: Yet although the accidents and dangers of gangrene were multiplied tenfold, this common way of cutting off the thigh, or amputating the arm at the ſhoulder joint, is bad doctrine, and cruel practice.

DISCOURSE III.

OF THE CONDITION OF A WOUNDED ARTERY;

OF THE NATURE OF THE TUMOR WHICH RISES OVER THE WOUND OF A GREAT ARTERY; AND OF THE WAY OF OPERATING IN THOSE RECENT ANEURISMS.

I AM now to explain to you the condition of a wounded artery; not where it is touched in a wide and open wound, for there the artery bleeds profuſely, and either it is preſently tied, or the patient dies. But I am to explain to you the ſtate of a greater artery, wounded deep among the muſcular fleſh, ſtruck perhaps with the point of a ſword or knife, or cut acroſs by a ball, for then the blood eſcapes difficultly through the narrow wound; there is little outward bleeding; the artery bleeds chiefly within, and by that inward bleeding forms a ſudden tumor of the moſt dangerous kind, requiring a ſudden operation almoſt as if the artery were ſtill open pouring out its blood: The artery, indeed, is ſtill open, is ſtill pouring out its blood, and nothing reſiſts it but the ſkin; if that ſlender barrier give way, the patient dies with one guſh of blood.

When a man is wounded in any great artery, the blood flows in ſo full a ſtream, that in a moment he faints, falls down, and it is then only that the by-ſtanders can command the blood, by gathering up any cloths that are at hand, and cramming them into the wound in a confuſed and ineffectual way, till at laſt the ſurgeon comes and ſtops the blood. Now the ſurgeon at the firſt ſight of ſuch a wound is himſelf alarmed, he fears that it is the great artery of the limb; he is unwilling to cut up the arm or thigh, and to undertake the tying up of the great artery without ſome farther help and advice; he throws off the looſe cloths or bandages; lays a fair and very firm compreſs upon the wound; rolls it with a ſteady bandage, and leaving a tourniquet about the limb, informs the friends of all his fears, and of all the expected difficulties and dangers of ſuch a caſe, and deſires that ſome conſulting ſurgeons may be called. The conſultation proceeds at firſt upon theſe points, the place of the limb that is wounded, the ſhape of the weapon, the deepneſs of the wound; but the ſurgeons do not in general unbind the wound, at leaſt if it be a deep and punctured wound, till the ſkin has adhered, till the aneuriſmal tumor is formed, and then being able to undo the dreſſings without any danger of farther bleeding, they have all the caſe before them.

The tumor riſes higher and higher every day; at every viſit they ſee a change. The tumor is large, hard, circumſcribed, and beating very ſtrongly; the ſkin over it begins to inflame, the wound of the knife threatens to open again, the whole limb is feeble and cold;

the ſurface of the tumor is livid, and in a few days the beating from ſuch an artery, as the Femoral Artery, is moſt alarming, and to the patient very awful; he ſpreads his hand broad over the tumor, feels its beating, like the heart in its ſtrongeſt palpitations; beating againſt the ſide. He is laid with tourniquets round the limb; he ſees by theſe precautions, and he feels, as it were, that if the tumor burſt during the night, he muſt loſe his life with one guſh of blood. Lying in this anxious condition, he is watched from hour to hour, till the time appointed for the operation arrives; and it is then only, (however great the ſurgeon's fears about this operation), that the patient is in any degree ſafe.

It is not always that the ſurgeon has his mind ſo ſettled concerning the tying of theſe great arteries, as to do his operation on the very moment of the wound; and yet he may as well do ſo; for whether he determine by his reaſoning that it is ſafe, or dangerous, to tie the great artery of the limb, ſtill the circumſtances of the wound are the ſame; and the artery, whether it be the great artery, or ſome ſecondary branch, whether punctured or fairly cut acroſs, is loſt to that limb; and ſince the wound itſelf of a great artery cannot heal, its cavity muſt be cloſed. This alone ſhould determine us how to move in this critical moment; and I am clear, that the ſurgeon when he is called in good time to ſuch a wound, ſhould clap the point of his finger upon the wounded artery, or make his aſſiſtant hold the artery; cut the wound ſo far open, as to ſee the artery fairly; draw it out if it be cut acroſs, and have ſhrunk among the fleſh; or tie it like the artery of the

arm in aneuriſm, by paſſing ligatures under it, if this greater artery be punctured only with the knife or ſword, as that of the arm often is with the lancet.

But in nine of ten caſes, the ſurgeon wants courage to do this, as he thinks, hopeleſs operation, upon the ſpot. The caſe falls to be determined by ſlow and heſitating conſultations, the ſurgeons debate whether it be the trunk of the artery that is wounded; whether if it be the trunk, it ſhould be tied; doubting perhaps, whether the limb ſhould not rather be cut off. Thus the outward wound is allowed to heal, the inward bleeding goes on, and the regular aneuriſmal bag is formed. There are certain circumſtances, in which it is even our duty to bring the caſe into this ſhape; for example, if there be a wound of the great arteries in the back of the hip, in the groin, in the armpit, we cannot command the blood eaſily; we are not ſure of clapping our finger down upon the artery, at the very point where it is wounded; we are afraid leſt the patient ſhould die, (even after we have come to him), with one ſingle guſh of blood; we therefore cloſe the narrow wound, put its lips together, ſettle it with a very ſteady compreſs and bandage, and try to make the lips adhere, and then we have a fair aneuriſm, which we can look upon compoſedly; we can reflect upon the courſe of the wound, and calculate which artery is moſt probably wounded; for beſides the main trunk there are other arteries in the armpit and the thigh, as the arteries of the ſcapula or the Arteria Profunda, which being wounded, will make aneuriſms as large, though not ſo dangerous as thoſe of the Axillary or Femoral Arteries,

and to be diſtinguiſhed from them chiefly by the pulſations in the wriſt or ancle, continuing ſtrong *.

The arterial trunks and all their greater branches in every part of the body lie under the faſcia; and ſeem to owe no leſs to the ſupport of theſe faſciæ, than the muſcles themſelves. Over all the body the faſcia is almoſt equally ſtrong; the ſkin and faſcia, where the wound is ſecured with compreſſes, are preſſed together and adhere; the blood, by this accident, is always driven hard under the faſcia, and is never diffuſed under the ſkin; the ſkin merely covers the aneuriſmal tumor, while it is the tenſe faſcia that gives form to the aneuriſm. The faſcia, thus confining the blood, limits the ſize of the tumor, gives it a fair and circular form, is itſelf tenſe and firm, livid alſo by the colour of the contained blood; ſhining and reſplendent like the inner ſurface of the gizzard of a fowl, and the ſkin and faſcia may be cut diſtinctly from each other, as freely as we cut the ſkin over a diſeaſed breaſt without touching the hardened gland, or rather, (for a more cloſe reſemblance), as we draw our knife clean along the ſurface of a hernia, without touching the ſac; or as we cut the ſcrotum over the hydrocele without touching the vaginal coat.

Nor is the ſurface of an aneuriſmal bag very irregular, even upon its back part, for each muſcle is involved in its own faſcia, ſo that the faſcia is alſo of tolerable

* The pulſation may ſometimes continue in the lower part of a limb, notwithſtanding a wound of its main trunk, from the obliquity of the outward wound, as ſhall be explained preſently.

ſtrength within; the internal proceſſes of the faſcia, and the condenſation of the cellular ſubſtance, (as it is driven cloſer by the blood), ſet alſo ſome bounds to its extenſion within, ſo that the blood is no more diffuſed among the fleſh, than under the ſkin; but the circumſtances of the tumor will vary infinitely according to the nature of the wound. I have ſeen the Femoral Artery cut fairly acroſs with the knife; there the wound, paſſing deeper than the artery, will allow of a greater bag, and the artery will pour out its blood behind, as well as before it. I have ſeen the Femoral Artery juſt touched with the point of a penknife and not transfixed, the wound not paſſing through the artery, no blood behind, but the aneuriſmal bag formed immediately beneath the faſcia and ſkin, and the artery keeping its place among the muſcles of the thigh; nothing of the artery but the wounded ſlit in it appearing, the muſcles adhering firmly to the artery, and with a degree of inflammation, and thickening; the flat ſurface of the artery nitched in among the inflamed muſcles, and the flat ſurfaces of the muſcles themſelves forming the back part of the tumor: and I have alſo ſeen the artery entirely cut acroſs by the fractured ends of the thigh bone, ſo that the oppoſite ends of the artery hung together by a ſingle tag, and the aneuriſmal bag, inſtead of being formed betwixt the faſcia and the great muſcles of the thigh, was formed betwixt the great muſcles and the bone, ſo that the broad belly of the muſcle named Vaſtus Internus, formed the chief ſurface of the ſac. But whatever be the form of the bag or the condition of the artery, let the ſurgeon be prepar-

ed to encounter difficulties, by trying to calculate how the parts may probably be connected with each other, whether under the faſciæ only, or under the muſcles, whether preſſed together by inflammation, or thickened by the driving and compreſſion of the blood.

Thus the advantages from an aneuriſmal bag being formed before we are called, or by our own compreſſes healing the wound, are theſe; that we are not hurried all at once into the midſt of a bloody operation; that we are ſomewhat eaſy about our patient's immediate ſafety, there being no danger of fatal bleeding, at leaſt for a few days; that we have warning of every dangerous change by the alteration in the ſurface; that we have time to conſult; to calculate which artery is wounded, and to ſettle all the ſteps as in any other operation, putting our tourniquets round the leg or thigh, or ſettling the compreſſes of the calvicle or groin, if the artery be wounded very high.

But it is equally plain, that though a recent aneuriſm is thus managed with more eaſe to the ſurgeon, and leſs loſs of blood to the patient, than a large and open wound; yet an old aneuriſm, ſuffered to grow for weeks or months, is attended with great danger; for if the artery be very great, as in the hip or thigh, the bag enlarges very rapidly; all the parts are compreſſed and hurt, the blood is driven deeper and deeper among the muſcular fleſh, and at the ſame time that the ſoft parts are diſordered, even the bone may be ſpoiled, which muſt render the operation ineffectual in ſaving the limb. The accumulation makes it more difficult to find the artery, preſſes it deeper

every moment, and farther out of the reach of the ſurgeon; the bag comes, in a few weeks, to hold ſix or ſeven pounds of blood, and this extenſion of ſurface, cauſes a greater ſuppuration, which (wherever the matter is, as in this caſe, contaminated with blood), is never kindly nor well diſpoſed to heal.

Wherever we have it in our power to apply the tourniquet, and command the blood; or in other terms, wherever we have to deal only with a wound, or ſmaller aneuriſm of the arm or ham, or the lower part of the thigh, the operation is eaſy. But in the greater aneuriſms of the armpit, haunch or groin, we muſt truſt nothing to compreſſion, and muſt do our operation with particular boldneſs and ſkill, otherwiſe we ſhall hardly ſave our patient, for in a very moment he his either ſaved or dead.

The rules belonging to this caſe of an aneuriſmal bag, holding ſome great artery, are chiefly theſe:

1. You are not to truſt entirely to the compreſſion which your aſſiſtant tries to make upon the groin, or below the clavicle; for it is one matter to ſuppreſs the pulſe in the lower part of a limb, and another to ſtop altogether the current of the blood; but you are to look upon this as an open artery, and expect that the moment you cut the tumor, the blood will ruſh upon you with a terrifying violence: nor ſhould you ever expect to clean the great cavity with ſponges or cloths, for the artery will fill the cavity with blood, faſter than you can throw it out, till the patient breathes his laſt. Inſtead of this, you draw your knife deliberately and fairly over the tumor, ſo as to lay it open. The ſkin

being thus divided, the great livid bag of the aneurism, ſurrounded with its ſtrong faſcia, riſes into view. Next puſh your lancet into the bag, and then do all that remains in your operation with great boldneſs; run your biſtoury upwards and downwards ſo as to ſlit up the tumor quickly; plunge your hand ſuddenly down towards the bottom; turn out the great clots of blood with your hand and fingers, till having reached the bottom entirely, you begin to feel the warm jet of blood, and directed by that, clap your finger upon the wounded point of the artery, as it has but a point, your finger will cover it fairly, and your feeling the beating of the artery, aſſures you that all is now ſafe.

Now the bleeding, confuſion, and fainting are over in a moment; the operator breathes, and the aſſiſtants are compoſed; and all the operation goes on eaſily and ſafely. The artery is effectually commanded by this preſſure with the finger; but the firſt movement in ſuch an operation, *viz.* the act of ſtopping the blood is all boldneſs, and nothing of caution; no danger is to be apprehended, but that of ſuffering your patient to loſe blood.

2. Being now compoſed, you take time to arrange every thing for the next ſtep of your operation, you feel the beating of the artery with the point of your finger, perhaps you lift the point of your finger for a moment, to diſcover whether the preſſure of your aſſiſtants, at the groin or clavicle, commands the artery: If ſo, you lift your finger, and examine round the artery; if not, you keep your finger ſteady, make the aſſiſtants clean the bag round the artery; then, if

is Op. is now ſeldom performed, it is better to pu

the artery lies fair and free in the bottom of the cavity, you proceed to tie it; but if not, you muſt diſſect round the artery, until you ſet it free from other parts, and have it ſo inſulated as that you may put your ligature eaſily under it; unleſs indeed the recollection of ſome great trunk being near the wounded artery (as of the Profunda, when you are tying the femoral artery) ſhould ſtop you; but yet the nearneſs of any great artery or nerve, is an argument as ſtrong againſt your diving with the needle to catch the wounded artery, as againſt your diſſecting with the knife. Since therefore the diſſection is done with your eyes open, and you can ſee and feel before the point of your knife; rather diſſect, or ſometimes tear the artery naked with the point of your fingers, tying its open mouth, if cut acroſs, as fairly as in an amputated ſtump; or if it be touched only with the point of a knife or ſword, put two ligatures round it, one above and one below the wound, and put them neatly and fairly round the artery, as in tying for aneuriſm of the arm, and cut it acroſs betwixt the two ligatures.

3. In regard to the ſize and form of your ligatures, do not allow in yourſelf the ſlaviſh and abſurd fear of cutting arteries acroſs with them. It makes ſurgeons uſe ligatures in amputation, ſuch as are often ineffectual; and in aneuriſms of the thigh or ſhoulder, they uſe ſuch tapes as it would be impoſſible to draw tight even round the aorta, though that could become the ſubject of their operation; the circle of the knot made by ſuch a ligature is often wider than the diameter of the arterial trunk. Surgeons have complained that

they could not draw their tapes tight enough round the femoral artery, even with the whole ſtrength of their hands.

Let your ligature, then, be made of three or four threads well waxed, tied not with the ſurgeon's knot, but with one ſingle knot moderately drawn, ſecured with a ſecond ſingle knot, the threads left hanging from one corner of the wound.

4. It can hardly be neceſſary to adviſe, that after ſuch operations upon the Humeral or Femoral artery, tourniquets be ſtill kept round the limb, to guard againſt thoſe accidents, which have ſo often happened, and will we fear continue to happen, in the hands of the moſt famous ſurgeon.

But if it chance that the parts are ſo maſſed with inflammation, ſo diſordered by the driving of the blood in old aneuriſms; or perhaps the parts ſo hurt, as to be almoſt in a ſtate of gangrene; if the ſurgeon cannot by any means get a fair view of the artery, and that his patient be loſing blood, pouring from ſome great trunk, then muſt he ſtrike his needle at random, in order to come at his object the neareſt way; and the only ſatisfaction that he can have, or the only proof of his having tied the artery at all, will be only the ſudden ſtopping of the blood, when he draws his ligature. In circumſtances like theſe, the greateſt ſurgeons, (even Mr. Pott himſelf), have been accuſed of having miſſed the artery; but at all events ſince it is irregularly tied, or perhaps not at all, the attendants that are appointed, muſt be ſkilful, and muſt be intereſted; both friends and ſurgeons ſhould watch

over the patient's life moſt faithfully; for ſucceſſive bleedings will happen, often from ſome ſudden turn, or unwary motion in his bed during the night; and he is loſt or ſaved in a moment of time *.

One thing I am chiefly afraid of, that this deſcription may ſeem overcharged; that I may appear to have exaggerated the difficulties of an operation like this; that it may be thought that an accident requiring all theſe precautions, and this plunging down of the hand, can hardly occur. Therefore I ſtate to you the following caſe, and I dare ſay, after having conſidered it, you will perceive that it needs no apology; but that as it is new and intereſting, it deſerves its place.

A poor man, who was by trade a leech-catcher, fell as he was ſtepping out of a boat, and the long and

* Mr Hume ſays, in reporting one of Mr. Pott's obſervations, that the depth of the inciſion made it very difficult for any one but the operator, and thoſe immediately around him, to ſee what was included in the ligature; and at the time the Popliteal Artery was *ſuppoſed* to be ſecured by it. The inſinuation is as direct, as good manners will allow; but it is more than an inſinuation; for in an account of the ſame caſe, publiſhed ſome years ſince, Mr. Hume ſays, "No doubt was made at the time, of its being any thing but the artery that he had tied." Next, Mr. Hume proceeds to reaſon upon it in ſuch a form, as to imply a direct affirmation, that the artery was not tied. Whether the aneuriſm was in a branch, or whether it was in the trunk of the artery, the pulſation ſhould not have been felt in the tumor, if the Popliteal Artery was rendered impervious: But however we ſhall chooſe to explain it, the fact is, that by the ſecond day after the operation, the artery was again throwing its blood into the aneuriſmal bag, ſo that a ſtrong pulſation was felt; and the tumor ſwelled ſo rapidly, that Mr. Pott cut off the limb.

pointed ſciſſars which are uſed in his buſineſs being in his pocket, pierced his hip exactly over the place of the ſciatic notch, where the great Iliac Artery comes out from the pelvis. The artery was ſtruck with the point of the ſciſſars, it bled furiouſly, the patient fainted; and in ſo narrow and deep a wound, the ſurgeon, when he came, found little difficulty in ſtopping it up, and leſs difficulty ſtill in making it heal. The outward wound was cured; the great tumor ſoon formed; and the man travelled up from the North Country, where the accident had befallen him, and in ſix weeks after arrived in our hoſpital here with a prodigious tumor of the hip, his thigh rigidly contracted, the ham bended, the whole leg ſhrunk, cold, and uſeleſs, as if it had been an aneuriſm rather of the artery on the fore part of the thigh.

The tumor was of a prodigious ſize, and by that very circumſtance of its being one of the greateſt aneuriſms, it loſt all the characteriſtics of aneuriſm, eſpecially there was no pulſation, no retroceſſion of the blood when the tumor was preſſed upon; there was nothing peculiar except this, that the great and ſudden diſtenſion was the cauſe of great pain; and from the continual pain, lameneſs, and his hopes of a cure, he was ready to ſubmit to any thing, beſeeching us to operate.

There was little doubt of its being a great aneuriſm, but there was a poſſibility of its being a vaſt abſceſs; and it was reſolved, in conſultation, that he ſhould be carried into the operation room; that a ſmall inciſion ſhould be made; that the ſkin being

cut, the bag itſelf ſhould be juſt touched with the point of a lancet; and if found to contain matter, ſhould be fully opened; but if blood, that it was then to be conſidered as an aneuriſm of ſo particular a kind, as to entitle us to call for a full conſultation.

I made an inciſion two inches and a half in length; the great faſcia in the hip, blue, and very ſtrong, formed the coat of the tumor, and under that were ſeen the big fibres of the great Glutæus Muſcle. The knife was ſtruck into it, and large clots of very firm black blood rolled out by the tenſeneſs of the tumor, which began to emit the clots in this way, the moment that it was opened at one point. There was one thing further deſirable before we put the patient to bed, that we ſhould underſtand the caſe ſo far as to be able to report to the conſultation, whether the artery was abſolutely open, and whether it was the great artery of the hip. I continued therefore (knowing that the opening I had made could be covered with the point of the thumb) to pull out a few more clots of blood, till the warm and florid blood began to flow; I then puſhed in a tent-like compreſs into the ſmall wound of the tumor, (*viz.* of the faſcia), laid a broad compreſs over the outward wound, and put the patient to bed with one of the pupils holding his hand upon the hip.

This was done at one o'clock, and at four the conſultation met, and the operation was performed. And in my notes, I find two ſteps of the operation chiefly marked: Firſt, That upon our opening the tumor fully with an inciſion of eight inches long, and turn-

ing out the great clots, the blood was thrown out with a whiſhing noiſe, and with ſuch impetus, that the aſſiſtants were covered with it, and in a moment twenty hands were about the tumor, and the bag was filled with ſponges, and cloths of all kinds, which had no better effect than the cloths, which, in any accident, the friends in great confuſion wrap round a wounded arm; for though the blood was not thrown in a full ſtream, nor in jets, it was ſeen riſing above the edges of the inciſion; it floated by the ſides of the cloths, which were preſſed down by the hands of the aſſiſtants. But we knew by a more alarming ſign that the artery was throwing out blood; for the man who was at firſt lying not flat, but ſupporting himſelf on his elbows, fell down, his arms fell lifeleſs, and without pulſe, over the ſide of the table, his head hung down and was livid, he uttered two or three heavy groans, and we believed him dead.

Secondly, Seeing in this critical moment that if he was to be ſaved, it could be only by a ſudden ſtroke, I ran the biſtoury upwards and downwards, and at once made my inciſion two feet in length: I thruſt my hand down to the bottom of the tumor, turned out the great ſponge which was over the artery, felt the warm jet of blood, and placed the point of my finger upon the mouth of the artery; then I felt diſtinctly its pulſe, and then only was I aſſured that the man was ſtill alive. The aſſiſtants laid aſide the edges of this prodigious bag, and ſought out the ſeveral ſmaller ſponges which had been thruſt in, and the bag being deliberately cleaned, and its edges held aſide, I kept the fore

finger of my left hand ſteady upon the artery, paſſed one of the largeſt needles round under my fore finger, ſo as to ſurround the artery: one of my friends tied the ligature, and then upon lifting the point of my finger, it was diſtinctly ſeen, that it was the Poſterior Iliac Artery,—that the artery had been cut fairly acroſs, and had bled with open mouth—that it was cut and tied exactly where it turns over the bone: and although the extremities were cold, the face of a leaden colour, and the man had ceaſed to groan, and lay as dead; though the faint pulſation could not be felt through the ſkin, in any part of the body; we ſaw the artery beating ſo ſtrongly, whenever I lifted my finger, that we were aſſured of our patient's ſafety; however, he was ſo low that after laying down the ſides of the ſac, and putting bandages round his body to keep all firm, we were obliged to have a bed brought in, and having given him ſome cordials, we left him to ſleep in the great operation room, attended by the pupils and by nurſes.

He was cured of this great wound in leſs than ſeven months, although his cure was protracted by the foul ſuppuration of ſuch a bag, and by the exfoliation of the Ilium and Sacrum, which ſpoiled, not ſo much from their having been laid bare by the laſt ſudden ſtroke of the knife, as by the aneuriſmal blood having lain upon them; the exfoliations were very large, and the Sacrum eſpecially continued exfoliating to the very day on which the wound cloſed.

I do not know whether this man be recovered entirely, for he left the houſe lame, from the contrac-

tions of the hip and ham, and walking by the help of a ſtick; but however, he thought himſelf fit to undertake his profeſſion, and went to England with that deſign *.

This caſe will impreſs the directions already given upon your mind, and is ſingular and well worthy of a place, ſince this was one of the largeſt aneuriſms ever heard of, containing not leſs than eight pounds of blood. It is an inſtance of one of the leaſt probable of all wounds, *viz.* a ſmall ſharp point touching one of the deepeſt arteries, and one of the largeſt; and wounding it at the very point, where it comes out from the trunk of the body; and where it cannot be compreſſed; for though my friend Doctor Farquharſon, tried to make ſome impreſſion upon the deſcending aorta, by preſſing down his fiſt into the belly, ſo as almoſt to touch the ſpine, ſtill there was a deluge of blood upon cutting up the tumor, and the artery beat ſtrongly under my finger.

But there is a thing more diſtreſſing to the ſurgeon, than all the difficulties of the operation, viz. That the artery after it ſeems to be ſecured, often gives way; ſo that as I have obſerved already, ſuch caſes are dangerous, not ſo much by nature failing in her buſineſs of ſupporting the circulation through the anaſtomo-

* Dr Farquharſon, who ſucceeded me in the charge of the Hoſpital has juſt informed me, of this man having called upon him after his return from England, walking ſtoutly, and in good health.

ſing arteries, as by the ſurgeon's not being able on his part to ſecure the greater arterial trunks; hardly any have died of gangrene; very many have died from the loſs of blood: It was from frequent diſappointments that Mr. Hunter was induced to change his operation; he tied the Popliteal Aneuriſm, not in the ham, but in the thigg; thinking to find the artery leſs diſeaſed at that higher point. It was under the ſmart of frequent diſappointments, that he thought of this new operation, and I fear, his diſappointments were not fewer after this change; for in glancing our eye over the liſt of caſes, we find, that it is by hæmorrhagy that patients have generally died, ſome after the common operation, ſome after the operation in Hunter's way, ſome have died early, ſome late, ſome even have died of bleeding, ſo late as the twentieth day.

In one of Mr. Hunter's operations, the artery gave way, even ſo late as the 26th day; for this fatal bleeding began firſt upon the 14th day; returned, and was ſuppreſſed by compreſſes upon the 19th day; burſt out upon the 20th day; and burſting out upon the 20th day a ſecond time, Mr. Hunter was forced to cut up the thigh on its fore part, and tie the artery anew: But ſtill the artery was not ſecured, on the 23d day it was ſtill bleeding, and on the 26th day it bled violently, till the man fell low, fainted, became delirious, and expired.

Mr. Birche's patient died on the 14th day; he went in the evening to ſee him, but he had juſt expired, "The limb was ſtill warm, he lifted the dreſſings, and he found a ſmall ſtream of freſh arterial blood iſſuing

from the wound:" Heiſter, and Hunter, and Pott, and the celebrated Sabbatier, and Mr. Duſchamps, and Mr. Deſſault, all of them have loſt patients by the burſting of the artery, and after death injections thrown into the Iliac Artery, have run freely out by the wound in the thigh. All theſe patients have died of bleeding, and all of them have lived long enough to prove that the limb was ſafe.—From theſe accidents, we are now certain, that there is either ſomething peculiar in the nature of a great artery, ſo that it cannot eaſily be ſubdued; or that there is ſomething wrong in our manner of operating, or that the confuſion of theſe operations is ſuch, that even the beſt ſurgeons are accuſed of having failed: Mr. Pott himſelf, was only *ſuppoſed* to have tied the artery of the thigh. Such accidents happening thus in the hands of the moſt famous ſurgeons, ſhould be remembered in vindication of thoſe to whom in future the like misfortunes may happen: Should they not alſo be a ſtrong motive for our ſtriving to find out by future obſervations what may be the cauſe?

We are not yet arrived at ſuch a degree of knowledge, of the ſtructure, and functions of arteries, as to underſtand fully the cauſe of this inſecurity; but we cannot be without a deſire to underſtand it. I ſhould put down here ſome notions on this ſubject more freely, if I thought them in any degree proved; but, however, the few that I ſhall now propoſe, leads us to precautions, which have this advantage at leaſt, that they do no ill.

The moſt obvious reaſons then, of this inſecurity, are

theſe, which they will beſt underſtand who are moſt employed in diſſection.——We obſerve towards the decline of life, a change on the conditions of the whole arterial ſyſtem plainly unfavourable to our operations. We find the arteries leſs pliant, ſometimes contracted, ſometimes enlarged, ſometimes oſſified, their coats always thick, and ſeparating from each other upon the ſlighteſt touch. They are brittle and fragile, and have a criſped feeling, they have loſt all their ſtrength, our injections burſt them, and our ligatures cut them acroſs; in ſhort, our anatomical injections go well or ſurely, only in the ſmalleſt arteries, or in the limber and pliant arteries of a younger ſubject: In ſubjects beyond the prime of life, they often fail. The anatomiſt knows by the firſt touch of the artery, when it is hard, that he needs not fix his tube there; and the ſurgeon often foreſees alſo by the firſt touch of his finger in performing his operations, thoſe terrible hæmorrhages, and burſtings of the arteries, which occaſion ſo much anxiety and diſtreſs. In ſubjects beyond the age of forty, we have more reaſon to be apprehenſive, though we often ſee theſe changes in the arterial ſyſtem, this tendency to diſſolution, or at leaſt to diſeaſe, very early in life *.

* Petit cut off the thigh of a gentleman, on account of a compound fracture, by which he had been confined eighteen months to bed, he found the Femoral artery ſo oſſified, that his tourniquet had no effect upon it; his ligatures did not draw its ſides together, there was no likelihood that cauſtics or cauteries, or any thing but continued compreſſion could have any effect, and he was obliged to invent a machine having two plates, which, by the working of a ſcrew, preſ-

ontinually upon the broad face of the ſtump

Thus, by the age of the ſubject, the arteries may want a diſpoſition to inflame; or by the thickneſs of the arterial coats they are not pliant, ſo that they cannot be put in contact; and, whether they have or have not the diſpoſition to inflame, they have not an opportunity of adhering—or by the greater caliber of ſuch an artery, its circle being wide in its natural condition, is puckered and unequal when it is tied; ſo that by this alſo it cannot ſo well adhere; and I am ſure, that the tapes which have been uſed for tying ſo great an artery, have often, when tied with the ſurgeon's knot, been larger in their diameters than the arterial trunk itſelf; and Mr. Duſchamps actually tells us of a ſurgeon, who could not draw his ligature ſo as to ſtop the artery, and was obliged on that account alone to cut off the limb.

Perhaps it is from natural and unavoidable cauſes like theſe, without ſeeking for any more curious explanations, that we are to explain the frequent burſtings of great arteries, as in the thigh or ham. We do not know all the cauſes, but thoſe which we do know, are ſuch as ſhould make us anxious and watchful in no common degree, with a continual and minute attention to every circumſtance in the tying of the artery.

Ulceration of the artery is the great, and almoſt the ſole cauſe of its burſting; for always the artery muſt be regarded as a part of the living body, ſubject to the ſame affection with the other ſoft parts. To enumerate a few of the cauſes of this ulceration of the artery, will ſuggeſt precautions very different from thoſe which have hitherto been practiſed; and will, perhaps, induce

ſurgeons to receive the oldeſt method of all, *viz.* that of tying the artery with two ligatures, and cutting acroſs in the ſpace betwixt them.

1. When a ligature is uſed too large for the occaſion, the ligature being ſtiff, firmly waxed, and unpliable, hardly compreſſes the artery even at the firſt, and no ſooner do the ſoft parts begin to die under the ligature, than the loop of it is found ſlack, the artery is not deſtroyed, nor its canal obliterated; the blood runs along, and iſſues as at firſt, from the wound of the artery.

2. The ligature, in place of being laid under the artery, after a fair and clean diſſection of it, is puſhed through among the muſcles and cellular ſubſtance, with a large and ſharp needle; in order to avoid the main artery itſelf, the needle is paſſed at ſome diſtance from it; the ligature is drawn firm, and the artery for the time compreſſed; but, in a few days, the ſoft parts under the ligature fade, and it loſes all command of the artery.

3. When, in this rude way, the great nerve is included along with the artery, the danger is not of that kind, which ſurgeons have uſually apprehended; we need not be afraid of convulſions and locked jaws; the tying of any artery is ſafe in this reſpect; but the danger is quite of another kind; it relates not to the nerve itſelf, but to the artery which is included along with it in the ſame ligature; for the nerve is an indeſtructible part; its firm coats defend it from the ligature; it is not compreſſed like the artery; it is not killed and mortified by the ſtricture; it never gives way to the ligature, and the ligature keeping its hold ſo

long, is ſure to produce diſmal conſequences; for this is the natural progreſs of the artery tied with a ligature; that it is ſtrangled by the ligature; the part thus ſtrangled, is ſoon to be cut off; but while the part of the artery betwixt the two ligatures, is thus cut off, the parts round which the ligature is directly applied, is only inflamed; the ſides of the arterial canal adhere; the canal of the artery is cloſed, before the ligature falls off. But when the nerve alſo is included in the ligature, the ligature holds its place; it keeps firm, even after the artery is cut acroſs; and, by keeping its hold too long upon the artery, the proceſs of inflammation is continued; the ulceration mounts upwards along the artery; and when it arrives at that point, where the channel of the artery is ſtill open, and when the ulceration weakens the coats of the artery, it burſts; and it ſometimes burſts from the progreſs of the ulceration, after the ligature has been drawn away.

4. On this, as on many occaſions, the ſurgeon forgetting that he is operating upon the living—forgetting that it is not the firmneſs of his ligature (which muſt ſoon be pulled away) that ſecures the artery, but that proceſs of adheſion of the ſides of the arterial tube which obliterates its cannal—The ſurgeon, forgetting that the artery is a part of the living body, and that his ligature operates only by conducing to a certain natural proceſs, is anxious about nothing but the mechannical firmneſs of his ligatures. In Hernia, the ſurgeon, in place of truſting the reunion of the inteſtines to the natural proceſs of adheſion, truſts to nothing but

enteroraphies, ſews the guts round and round with a double row of ſtitches, which can produce nothing but gangrene; and tying arteries, he truſts to nothing but ligatures, and uſes four ligatures, which can have no other effect than cauſing ulceration and burſting of the artery.

Firſt, When two ligatures only are applied, there is ſome chance of thoſe ligatures cauſing a mortification of the intercepted part of the artery, and an adheſion of thoſe points round which the ligature is applied, there is a chance that the ligatures will come away at the time when the two ends of the artery cloſe; that the inflammation will ceaſe, and the ends of the artery ſhrink among the ſurrounding fleſh, and mix with granulations of the healing wound.

Secondly, When the artery is tied with two ſuch ligatures, and then relays of ligatures, *i. e.* ligatures to be drawn tight upon the occaſion of any hæmorrhagy, are laid looſe under the artery, an inch above, and an inch below each of the ligatures—this attempt at ſecurity is the real cauſe of danger; with this operation, it is almoſt impoſſible that the artery, however ſafe at firſt, ſhould continue ſecure. For, when the firſt ligatures are performing this office of obliterating the artery, and cutting it acroſs, the occaſional ligatures are operating their worſt effects: They are not tight about the artery; they do not obliterate it, but they irritate the coats of the artery; they keep it inſulated; they infallibly cauſe ulceration;—and ſo inſidiouſly does this dangerous ulceration creep along the artery, that the blood often burſts out long after the ligatures are removed. Nor can you be ever aſſured of your pa-

tient's ſafety to the 20th or 30th day; nor indeed till the wound is almoſt healed:—While there is a ſuppurating cavity in which the artery may lie ulcerating, you never are ſecurely ſafe.

From this theory, I am perſuaded, that the uſual practices for ſecuring an artery, are the chief cauſes of danger. That the more mechanical ingenuity the ſurgeon exerts, the more is he expoſed to the moſt diſtreſſing accidents. Every attempt at mechanical ſecurity, is likely to produce ulceration of the arterial tube; and the ſtripping of the artery of much cellular ſubſtance; the ſeparating the arterial tube from the bed of cellular ſubſtance in which it lies, and from the veſſels by which it ſhould be nouriſhed; the laying pieces of cork under the ligature; the uſing pieces of tin-plate; the laying pieces of bend-leather under the artery, and the uſing machines like that of Mr Duſchamps*, for ſecuring the great arteries; and, moſt of all, the laying a ſucceſſion of ligatures under the artery, are ſure to produce ulceration and ſecondary hæmorrhagy.

Thirdly, When we conſider the difference in the ſecurity of an artery tied in aneuriſm, and tied in amputation, the one the moſt ſecure, the other the moſt uncertain operation in ſurgery, we cannot but ſuſpect that the cauſe of inſecurity, in aneuriſm, is merely from the inſulated condition of the artery: for, from the great ſize of an aneuriſmal ſac, from the quantity of blood effuſed round the wounded artery, and from the

* Vid. Fourcroy.

deſtruction of the cellular ſubſtance, it is ſeparated from all thoſe vaſcular connections which ſhould keep it alive and in health, and the operations uſually practiſed upon the wounded artery ſerve but to inſulate it the more. When thoſe things are conſidered, perhaps, the oldeſt operation of all will be found the beſt, *viz.* to find out the artery, and tie it with two ligatures; cut it acroſs betwixt them, and allow it to ſhrink, and bury itſelf among the ſurrounding fleſh.

It is ſurely a point of the very firſt importance, to have the wounded artery ſooner buried in granulations and in ſound fleſh; for though the healing of an artery depends always in part upon its own lively diſpoſition to adhere, yet it muſt depend alſo in ſome degree on the ſupport of ſurrounding parts. Bleeding from a tied artery ſeldom comes on till the 4th or 5th day; and if we could here, as in other great operations, lay the ſkin down and make it adhere before the 6th, or before the 12th, or even before the 26th day, (as my late obſervations explain to you), we ſhould have it all ſound before the uſual period of bleeding; but the ſurface is often large, the ſuppuration bad, the artery lies expoſed, and may be dilated, or it muſt be eroded by the foul pus. Birche ſays, it was where the great artery of the thigh ſeemed to have ulcerated, that his injection ran out. Hume ſeems to attribute the death of his friend's patients to great ſuppuration, formed round the bed of the artery; and certain it is, that Hunter ſucceeded better, when in ſome caſes he cloſed up the thigh immediately with ſtitches; for, in one caſe he procured almoſt an immediate adheſion of

the wound, and in a few weeks a perfect cure.—Parée, Guy de Chauliac, and all the older ſurgeons, knew well the importance of ſurrounding and ſupporting an artery, and burying it quickly under the granulations. The Arabians, in their operations for aneuriſm, firſt tied their ligatures, and then cut the artery acroſs, ſo that either end of the artery ſhrunk (ſurrounded by its own ligature) in among the ſound fleſh, and was no more ſeen. But, independently of all authority, the reaſon of the thing inſtructs us not to keep our wounded artery, as ſome chooſe to do, open, that they may ſee it and tie it when it burſts out, but to bury it ſo among the riſing fleſh that it may never be ſeen, and that in a few days it may be ſafe from burſting.

After all that can be ſaid or done in explaining this burſting of arteries, from diſeaſe, this ſtrong indelible impreſſion muſt dwell upon our minds, that there muſt be ſome imperfection in our way of operating; or not to mince the matter, there muſt be ſomething abſolutely wrong in our operation. Some caſes are ſo managed, that one ſurgeon dare ſay of another, that it was ſuppoſed that the artery was tied; and can uſe this plain expreſſion after the diſſection of the limb. But there is this better reaſon ſtill, for ſaying that there is ſomething radically wrong in this operation, for in all our other operations with the needle we ſucceed. What then can the difference be, betwixt this tying of the Femoral Artery in aneuriſm, that it is ſo full of uncertainty and imminent danger; and the tying of the

ſame artery in amputation, where the ſurgeon thinks the death of one patient by hæmorrhagy a flagrant diſgrace? Or, why is it, that although in an amputation of the thigh, we tie the Femoral Artery itſelf; though we tie alſo the Profunda, or four or five of its greateſt branches; though the ſtump often continues open; though the arteries are unſupported; though a great ſuppuration, and often a very acrid one, enſues; and although the arteries continue in this dangerous condition for fifteen or twenty days; yet our tyings ſeldom give way! I fear that the difference is no other than this, that in amputation we have our tourniquet about the limb; we look upon the broad ſurface of the ſtump; we ſee the naked arteries, draw them out fairly from among the fleſh, tie them ſteadily and deliberately with a ſmall ligature; and whatever afterwards befalls ſuch a ſtump, if it do not fall into abſolute gangrene, or ſomething near it, the arteries are ſecure: While, in the operation for any great aneuriſm, we ſometimes have no tourniquet; the compreſſion does not ſtop the blood; the patient faints before half our buſineſs of cleaning the ſac is over; or the parts are ſo maſſed with inflammation, that the artery is never either well ſeen or ſecurely tied; the patient is loſing blood during every moment of this ſeeking for the artery; at laſt he faints, and the ſurgeon in great alarm ſtrikes his needle among the fleſh and ſuppreſſes the bleeding for the time; and thus it is, that in the end the caſe terminates ſo, that it is ſaid, "No one doubted at the time, that he had tied the Femoral Artery;" while it is plain that he had not, from the event of the caſe. In this ſtate of the buſi-

neſs, then, we are hardly entitled to talk about diſeaſed ſtates of the arteries, which after all ſhould be as frequent in amputation as in aneuriſm. We had beſt lay down a reſolution of running all riſks, in cutting new arteries, rather than not diſſect the artery clean. Let us diſſect it clean, and then tie it as fairly as in an amputation of the thigh; and if this really fail, then let us return to our experiments and ſpeculations, and endeavour to find out the cauſe.

DISCOURSE IV.

OF THE BLEEDINGS FROM THE SMALLER ARTERIES;

WITH SHORT HISTORIES OF THE OPINIONS CONCERNING THE STOPPING OF HÆMORRHAGY.

By the wounds of the ſmaller arteries, I mean thoſe of arteries of the ſecond order, as of arteries in the fore arm or leg; not ſo large as to produce great and dangerous aneuriſms; but ſtill of ſuch importance, as ſometimes to occaſion the patient's bleeding to death.

Sometimes the patient is bleeding from a broad and open wound, and falls down with the loſs of blood; he is for the preſent time ſaved by fainting, but by repeated hæmorrhages his conſtitution ſuffers, or he even bleeds to death; and very often, ſuch ſucceſſive bleedings from a ſmall artery, or too often the want of ſkill in the ſurgeon, are here, as in the greater aneuriſms, the ſole reaſon for cutting off the limb. Sometimes the artery is wounded obliquely; and the ſurgeon, never able to ſee the real place of the wound, attempts ſome confuſed or irregular operations, till, the patient loſing blood, from day to day, grows languid and low, and after ſome ſudden return of the hæmorrhagy, faints and expires.

Sometimes alſo the arteries are wounded deep among the muſcles; and there the blood corrupting the muſcular fleſh, or even ſpoiling the bones, is the occaſion, (after long ſuffering) of the patient's loſing often his limb, and ſometimes his life, although he ſhould even eſcape all preſent dangers from the immediate loſs of blood.

Under theſe, as the chief heads of my diſcourſe, I ſhall explain to you all that remains of this moſt intereſting ſubject. For whether I conſider the ſuddenneſs with which theſe embarraſſing accidents overtake the young ſurgeon; or the frequency of the accidents themſelves; or the preſent or the remote conſequences of ſuch a wound; or the ſtrange things that we read every day, of wounded arteries managed in a trifling undecided way; of patients dying, or loſing their limbs, even from wounds of the Radial Artery at the wriſt; of ſurgeons unprepared, uncertain what they ſhould do, ſometimes diving clumſily with their needle among the fleſh, ſometimes thurſting a ſponge into the wound, ſometimes laying clumſy compreſſes upon the artery, with little better ſkill, and no better ſucceſs than the friends could do; and worſe than all, of ſurgeons expoſing themſelves, by holding conſultations, to determine what next to do, or whether to cut off the limb;—I cannot but think this ſubject very important: And as it is important, I believe it will be well to explain to you firſt of all, the only thing which ſtands to this ſubject in the relation of a general doctrine, viz. the opinions of authors, concerning the various ways in which bleeding arteries are cloſed,

(whether by the formation of a clot, or whether by the retraction of their open mouths, ſhrinking among the fleſh); for upon this hiſtory of opinions there follows, in moſt natural order, a ſhort hiſtory of the means that have been uſed for ſecuring arteries, as ſtyptics, compreſſion, ſponges, and the needle: But yet on this, as on many occaſions, it is really the practice that ſuggeſts the doctrine, which then aſſumes a moſt impoſing appearance, and ſeems to be itſelf the root of all the improvements in practice *.

Mr. Petit was the firſt who called the public attention to a point of practice, which was of particular importance, at a time when the practice of tying arteries was not fully eſtabliſhed, when ſurgeons ſtill had their fears, and were ſtill talking about convulſions, and the

* The juſtly celebrated Mr. White, relates the conſequences of bleeding from the Radial Artery, in the following terms. "The arteries of the wriſt having been cut, had been twice taken up by Mr. ———, a ſurgeon well accuſtomed to the operation; and Boviſta and many other things had been tried. After each of theſe methods, the hæmorrhagy ſtopped for a few hours, and then frequently burſt out again; eſpecially upon the acceſſion of a hot fit, to which he was now very liable. On the 7th day, I was called in conſultation with Mr. Allan, to take off the arm: we found his hand and arm ſwelled to three times its natural ſize, from the frequent uſe of the tourniquet; which had been under a neceſſity of being moved to different parts of the arm, on account of the excoriations it had occaſioned. For the laſt 24 hours, it had been applied almoſt without intermiſſion, from a dread of his bleeding to death, as he had loſt a prodigious quantity of blood. After the dreſſings and clotted blood were removed, we could diſtinctly ſee the mouth of the veſſel, throwing, per ſaltus, what I can ſcarcely call blood, as its colour could hardly be diſtinguiſhed upon linen."—White's Cases.

yielding of the ligature, debating hotly the danger of this operation.

Mr. Petit believed, that every bleeding artery was ſtopped, only by the formation of a clot; aſtringents made clots, by coagulating the blood; ſponges, boviſta, charpie, made clots by abſorbing the moiſture; compreſſes made ſurer clots, by ſhutting the mouths of the arteries, and by allowing time for the coagulation of the blood; and even the tying of arteries was uſeful chiefly by forming a clot, but leſs ſecure, ſince whenever the ligature came off from the artery, the clot was looſened, when often there was a ſlighter bleeding, from blood paſſing by the ſide of the clot, and ſometimes there was a full hæmorrhagy, from the clot being driven forwards, and at laſt expelled by the blood. In a tied artery, ſays Petit, we have a conical clot; in an artery which has been compreſſed, (ſince the artery is flattened like the reed of a hautboy), we have a flattened clot: In arteries ſtopped by charpie or aſtringents, we have a clot formed, partly by the contraction of the mouth of the artery, partly by the effect of the dreſſing, ſo that ſuch an artery is ſtopped by a ſort of double clot, of which there is one part ſmall and conical, which, like a plug or cork, fills the canal of the artery, and another adhering to the dreſſings, of a flattened form, lying like a lid or cover over the mouth of the artery, but ſo connected with the other, that the rude or early removal of the dreſſings, pulls out this cork-like clot.

The chief of Mr. Petit's obſervations, for proving the authenticity of this doctrine, was this, that in diſ-

ſecting the thigh of a man who had died five days after amputation, he found in the great Femoral Artery, a large and ſolid clot. This he preſented to the Royal Academy of Sciences in great pomp: But I believe it were no difficult matter to prove, that this great academy of the great King of France, Louis Quatorze, was very eaſily ſatisfied with preſents of this nature; but rather than ſpeak this kind of language, I ſhould chooſe to ſay, that ſuch a proof does not prove his very dangerous doctrine. It is a fact, which every one would do well to admit eaſily, whether he do or do not like the doctrine: for it is not likely, that the mouth of an artery ſhall be ſtopped up after amputation, without the blood being coagulated behind the ligature; nor is it likely that the arteries ſhould all lie dead for ſome days in a gangrened limb, without the blood alſo lying ſtagnant in theſe motionleſs arteries, and coagulating of courſe. We are not therefore ſurpriſed to find many proofs of coagula being formed in every artery of a gangrened limb, or in the chief arteries of an amputated ſtump, or in the artery which has been tied for aneuriſm; nor are we ſurpriſed, on the other hand, if in many diſſections no ſuch clots are found. It is an accident plainly; no ſurgeon depends entirely upon a matter of ſuch chance as this; no ſurgeon ſcarifies a gangrened limb, without having ſome thoughts about its great arteries, nor is there any ſurgeon almoſt, who has not ſeen very dangerous bleedings, from imprudent ſcarifications of ſuch a gangrene. Why then ſhould Mr. Pouteau *, be at ſo much pains

* Vid. Pouteau, page 306.

in denying accidents like theſe, ſeeing that ſuch clots are both ſo likely to happen, and are really ſo well proved by Hunter, and others; and ſeeing that the formation of ſuch clots, has ſo little to do with that doctrine which Petit wanted to eſtabliſh, and which Mr. Ponteau wiſhed ſo earneſtly to refute. The proving that clots are formed in arteries, is no proof that it is the clot only that cloſes ſuch arteries; but rather, that it is the cloſing of the artery that forms the clot. The next proof that Mr. Petit gives of his doctrine, is really very ludicrous; for he next proceeds to ſettle the value of the various abſorbents, by a long ſuite of experiments, which he conducted in the following manner:—"Aſtringents and ſuch ſubſtances, as uſually are employed for ſtaunching the blood of wounds, ſurely muſt do ſo, ſays Mr. Petit, chiefly, by abſorbing that humidity, which lies between the veſſels and the fleſh*." Petit made all his aſtringents abſorbents, chiefly that they might drink up the thinner parts of the blood, and ſo help to form for him good, ſtiff, ſolid clots: he puts lumps of mutton into tea cups, with a reaſonable proportion of the following aſtringents: firſt of common bole, then of terra ſigillata, which is a finer earth or bole, then of Paris plaſter, then of ſlacked lime, then of various gums, then of gum-arabic, then of vitriol, then of ſalt, then of ſugar, and laſt of all, of ſpider's webs; and obſerves, with moſt curious preciſion, the exact degree in which each of theſe uſeleſs fooliſh things contracted, or hardened the lumps

* Vid. Academ. des Sciences, Ann. 1732, page 321.

of mutton; which experiments are ſtill extant in excellent French, in the Acts of the Academy of Sciences, for the year 1732; a perfect burleſque upon ſuch experiments, and ſuch ſubjects: And towards the end of this moſt philoſphical paper, Mr. Petit inſerts this wiſe caution, which completes the joke. "But all theſe aſtringents muſt of courſe abſorb more humidity, and act in a more lively and perfect manner in the living body; whoſe parts are always warm, and always ready to put themſelves in motion, by the force of the *animal ſpirits*, which are continually flowing *." But I ſhould want all apology for this long account of Petit, and of his doctrine, if it were not that it is a dangerous doctrine, and had abſolutely led Petit himſelf into great miſtakes; he perſuaded himſelf that the ligature was hardly more ſecure than any common means of ſuppreſſing bleeding; that it was only ſo far uſeful, as it enſured a firm and conical clot; that if the ligature fell off before this clot was fully formed, and perfect in its office, the artery would bleed. He therefore preferred the uſe of a compreſs, to that of a ligature, even in ſecuring the arteries of a great ſtump: And we find him boaſting, that though this method, viz. of compreſſion, is the oldeſt of all, he will give to it all the effects of novelty; and ſince it is the moſt natural way, and the very means which ſhould have preſented itſelf, firſt of all, to the imagination of the

* Tous ces aſtringents doivent abſorber plus d'humidité, et agir plus efficacement, ſur les parties d'un corps vivant, qui ſont chaudes, et toujours pretes a ſe mettre en contraction par les eſprits animaux qui y coulent inceſſamment.

ſurgeon, I will reſtore it, ſays Petit, and ſet it up above all other means; as cauteries, aſtringents, ſponges, or even the ligature itſelf*." There is not one of all theſe, ſays Petit, that is ſufficient of itſelf; we muſt uſe the compreſs, to aſſiſt even the ligature.

We have here a moſt curious example of a man's genius and his good ſenſe at variance with each other. His theory ſeduced him, his good ſenſe would have kept him right; we find him forcing himſelf, as it were, to ſay, "I will uſe the compreſs in preference to the aſtringents, ſtyptics, cauſtics, or even the ligature itſelf; wherever it is poſſible for me to do ſo†;" which is plainly acknowledging, that he would uſe that kind of uncertain operation, to which his theory inclined him, wherever he was not forced by the immediate danger of the caſe, to return to ſome ſurer means of reſtraining the blood.

And in one particular caſe, where after amputation of the thigh, the great Femoral Artery had by a ſudden motion of the patient, given way; we find Mr. Petit ſo averſe to the uſe of the needle, that he would not tie this artery a ſecond time, he kept his patient for many days in a very unhappy and very dangerous condition; attended by four young ſurgeons, who relieved each other every hour, continually preſſing with the point of the finger upon the mouth of the artery; till at laſt, he got a machine made, a ſort of clumſy

* Vid. Poſthumous Works, page 164. Vol. III.

† Soit par rapport a l'uſage excluſif que je lui donne, en rejettant celui des aſtringens, des ſliptiques, des cauſtiques, et de la ligature même, AUTANT qu'il EST POSSIBLE.

complicated tourniquet, which, by the help of two broad plates, kept up a firm compreſſion upon the whole face of the ſtump.

If theſe practices, and the invention of ſuch machines, are to be the beſt fruits of ſuch doctrines, we ſhould be careful how we receive the other doctrines which have followed this in a rapid ſucceſſion.

Next comes Mr. Morand, who adds his little bit of a doctrine to Mr. Petit's, which, whether true or falſe, was framed upon a grander ſcale. "No doubt," ſays Mr. Morand, "Petit has explained vaſtly well how the clots ſtop bleeding *, but theſe clots cannot be the worſe for ſome help from the artery." I think I ſhall be able to give you a tolerable idea of what his confuſed notion was, in one ſingle word: For, it was neither that contraction of the diameter of the attery, which has been ſince then ſo diſtinctly made out by Kirkland, White, and many of our beſt Engliſh ſurgeons; nor that retraction of the artery among the ſurrounding fleſh, which has been ſo much inſiſted upon by Pouteau and other good authors; but an equivocal generation betwixt theſe two ideas floating confuſedly in the man's mind. You have his notion all at once, when I tell you, that the word by which he always expreſſes it, is the criſping up of the artery, "par la criſpation du tuyau:" And he can tell no more about it, than that this cabaging of the artery aſſiſts the clot.

* Memoirs de la Societé Royale des Sciences, An. 1736, page 321.

Next came Mr. Pouteau, whoſe experiments and reaſoning approached indeed nearer the truth; but always a man reaſons firſt, and makes his experiments after; and this is plainly the light in which his diſſections are to be viewed.

"I have diſſected a Femoral Artery, ſays Mr. Pouteau, three weeks after it had been tied in amputation; but in it I found nothing of Mr. Petit's clot; nothing to cloſe or compreſs the artery, except merely the thickening of the ſurrounding cellular ſubſtance; for the ligature was looſe about the artery. The canal of the artery was conical, for it grew narrow nearer to the ligature. Immediately under the ligature it was not obliterated but was much ſtraitened: It was only below the ligature that it was entirely ſtraitened, ending in a blind ſac." This ſtraitening of the arterial tube was accompanied, or rather, according to Mr. Pouteau, was cauſed by a thickening of the ſurrounding fleſh: for the fleſh which ſurrounded the ſtraitened part of the artery, was a good deal gorged and ſwelled; that which lay immediately under the ligature, was in a ſtate of gangrene; the fleſh again which adhered about the mouth of the artery where it ended in the blind ſac, was of a cartilaginous hardneſs and much ſwelled. Of courſe, it was Mr. Pouteau's opinion, that it was the ſwelling of the ſurrounding cellular ſubſtance that compreſſed the artery and ſtopped the blood.

This, then, being the doctrine of Mr. Pouteau, his practice follows his doctrine reaſonably enough: for, ſays Mr. Pouteau, "Let it be once proved that it is the

ſwelling merely of the parts ſurrounding the artery that prevents the blood, it follows of courſe, that the greater the bundle of fleſh that is accumulated round the artery; the more of the parts you include in your ligature, the greater the ſwelling muſt be, and the reſiſtance to the irruption of the blood muſt be proportionably great*.

Mr Pouteau is cunning enough to ſhow us only an arterial trunk tied coarſely with the needle, with much cellular ſubſtance ſurrounding the artery above the ligature, and ſome below; and thus he takes his opportunity of inſinuating his doctrine, by ſaying, "there was much cellular ſubſtance thickened above the ligature, and there was a like thickening of the cellular ſubſtance below; and the artery was not obliterated at that point where the ligature was, but only its mouth was cloſed."

But what is to be ſaid of thoſe caſes, where there is little cellular ſubſtance ſurrounding the artery above, and none below; where the artery is drawn out with the tenaculum, and tied clean of all the ſurrounding fleſh, and what would happen in this caſe, if the artery were not obliterated at the point, where the ligature compreſſed its coats? This doctrine of Mr Pouteau's, ſeems at leaſt to be harmleſs; it ſeems to inculcate the tying of arteries with the needle in the ſureſt way.

* Mais s'il eſt une fois avéré que le gonflement des parties au deſſous de la ligature, fait le principal obſtacle a l'irruption du ſang arterial, il ſera naturel de conclure, que plus ce gonflement ſera conſiderable, et plus il oppoſera de reſiſtance a l'impetuoſité du ſang arterial.

But, here alſo there is a villany inſeparable from all falſe doctrines, which lead us unawares into very dangerous and very extravagant practices, ſuch as in our cooler moments, we cannot remember but with regret. Mr. Pouteau inſiſted upon including all the parts; he had no ſcruple, under this ample title of all the parts, to include the nerves; he conſidered the tying in alſo of the nerve, as a ſecurity to the tied artery, or I fear rather, he conceived that it would be a ſecurity to his doctrine; and ſo he proceeds to repreſent the tying of the Radial Nerve in an aneuriſm, as nearly harmleſs, and the tying the extremity of the nerve in amputation as quite ſo; till at laſt, hardened by bad practices, and blinded by doctrine, ſome ſurgeons of the very higheſt character came, as it were, to play with our judgment, and to ſport with their patients feelings, ſaying: "May not the pain upon tying a nerve, as it is ſmart and of ſhort duration only, ſomewhat in the manner of volatiles applied to the noſe, rather *enliven* the *ſpirits*, than bring on convulſions*." This is enough to cure any ſenſible man of any inclination he may have indulged, to hearken to thoſe who blend theory and facts in this ſtrange faſhion, who compare the ſmart pain, or rather as I would term it, the ſhock and terrible violence of tying a nerve with ſo ſlight a matter, as the ſnuffing hartſhorn up the noſe. Let any man who will talk to me on this point, firſt demonſtrate that the tying in of the nerve will do good, before I cloſe with him upon the ſecondary queſtion,

* Kirkland, p. 22.

whether it may not do harm. I have conſtantly obſerved, that the tying of a nerve gives immediate pain; ſo that the patient has always cried with the anguiſh of it; and to ſay the leaſt of it, there is ever a ſlow ſeparation of the ligature, ſo that it is not to be got away, till it be cut out. How elſe indeed ſhould any ligature hold its place, upon an amputated ſtump for three weeks, as this of Mr. Pouteau did, unleſs it were tied round the nerve? I have ſeen ſuch conſequences ariſing from tying the nerve in aneuriſm, as I am not at preſent entitled to explain; but which make it a duty with me to adviſe you againſt this practice, which is at leaſt ſuperfluous, if not hurtful.

Amidſt all this confuſion of opinions, there was engendered here, in England, a new doctrine, about the contraction of arteries; bearing no other mark of authenticity, nor any thing elſe to command one moment's attention; but that it has been embraced by ſome of our moſt able ſurgeons, eſpecially by Mr. Kirkland, and by the celebrated Mr. White; "For I am now convinced, ſays Mr. White, in oppoſition to the doctrine of Mr. Pouteau, which once ſeemed more probable, that according to the ſuppoſition of Mr. Gooch, ſince confirmed by my ingenious friend Mr. Kirkland, the arteries by their NATURAL CONTRACTION, coaleſce as far as their firſt ramifications *."——— Mr. Kirkland ſays, in perfect harmony with Mr. White, "that nature ſuppreſſes the hæmorrhages from divided arteries, by the natural contraction of their muſcular

* Page 171.

fibres," p. 10 †. But if it really were ſo, this concluſion ſhould follow, more dangerous than the raſh concluſions of Mr. Petit, that the compreſs or the ſlighteſt aſtringent would be more effectual than the needle; and that keeping the point of the finger for a few minutes upon the point of any ſmaller artery, until it had time to contract, would be quite ſufficient to ſtop the blood.

This contraction of the artery, an accident which cannot or need not be denied, does more harm than good; if it ever ſuppreſs bleeding, it muſt be only in arteries of the ſmalleſt order, the bleeding from which ſtops thus ſpontaneouſly, and needs no particular care.

† Mr. Aitkin Warrington, is alſo of the ſame opinion, as may be ſeen in his Pamphlet, p. 173, where he ſays, "That the obliteration of the ſac, in the extremity of the artery, is cauſed by its *natural contraction.*" They have been at great pains, to found this doctrine on principles and facts. The only facts, are the docking of horſes tails, and the cutting off their legs. Theſe are to be found in Mr. Kirkland's Treatiſe; and the only principle, that is to ſay, the only general fact, which I have ever yet been able to diſcover, is, that an artery cloſes, not only immediately under the ligature; but for a conſiderable way above, that is, up to the neareſt inoſculating branch. The cloſing under the ligature is plainly the work of the ligature; the obliteration of the canal, higher than the ligature, is ſuppoſed to ariſe from this contraction of the artery. The explanation that I ſhould chooſe to give of the appearance, is this: That the contraction under the ligature could not be permanent; that the artery would open the very moment the ligature was withdrawn, if its ſides had not adhered. The cloſing under the ligature, therefore, I conſider as the adheſion, which follows the ſtricture. The obliteration above, I conſider as a thickening, or continued adheſion, by the inflammation going a little forward along the arterial coats.

But the contraction of a larger artery often ſtops the bleeding for a time; its retraction among the cellular ſubſtance hides from the ſurgeon the arterial mouth from which the blood had flowed; and thus it bleeds again unexpectedly, endangering the patient's conſtitution, or even his life; if the ſkin heal over it, it forms aneuriſms under the ſkin; or, where the ſkin has not healed over it, I have ſeen it form a ſort of aneuriſm among the ſoft granulating fleſh.

From all that we have ſeen, we have reaſon to be jealous of any doctrine, which leads to a laxity of practice, in reſpect of tying even the ſmaller arteries; or which holds out any ſuch apology, as the contraction of arteries, or the formation of clots. No modern ſurgeon, I believe, would think his buſineſs ſecurely done, while he conceived any great artery to be ſecured merely by a clot; nor will any ſenſible or cautious man be eaſy, when he has miſſed a bleeding artery, or while he is waiting till it contract: Nor will any man who has that degree of dexterity and boldneſs, which the management of bleeding arteries requires, be ſatisfied, until he has tied every artery fairly, unleſs it be in ſome very difficult or dangerous place; for it is only to the ADHESION and total OBLITERATION of an artery, that we can truſt with ſafety: How this is beſt to be procured, may, I think, be made very plain.

We find an artery as capable of inflammation, as any other part of the body. We find an artery deſcribed by Mr. Hume as inflamed, not only at the point, where it was tied for a Femoral Aneuriſm, but alſo onwards from that point quite up to the heart.—If an artery, inſen-

ſible as it is, be thus ſuſceptible of inflammation, we know, *a priori*, that the tying it ſo hard, as almoſt to cut through its coats, will always, or almoſt always, make it inflame. We have it proved by Pouteau, Kirkland, and others, who intended to prove nothing more than the contraction merely,—that its coats are thickened, and that its canal is obliterated under the ligature, and contracted above it, to a degree which their doctrines of natural contraction or retraction of the artery will never explain: All this is proved by ſurgeons, who continued talking about the contraction and the retraction of the artery, after they ſaw evidently, that the internal ſurfaces of the artery had adhered *. And finally, the proceſs, as it goes on in nature, is plainly declared by the effects of our common operation of aneuriſm of the arm; for there we apply two ligatures, which include the length of two inches of the Arterial Trunk; they are drawn tight upon the artery, one above the point wounded by the lancet, and one below; and both theſe ligatures come away

* "Another woman, ſays Mr. White, having died three weeks after the amputation of her leg; I was deſirous of ſeeing in what ſtate the arteries were, after the uſe of the ſponge; and for this purpoſe, laying bare the Humeral Artery, I cut it open to the place where it divides into the radial, and ulnar branches: I then introduced a common ſilver probe into each branch, which paſſed very eaſily to a certain point, which ſeemed about an inch from the extremity of the ſtump; but could go no further. I next laid open the arteries to their extremities, and found them entirely cloſed, near an inch from the end of the ſtump; but from that point upwards, their capacities were not at all diminiſhed, nor was there any coagulum or clot of blood in the veſſels, or any where near them." Vid. WHITE'S CASES.

eaſily (and without our cutting the ring of the ligature) upon the third or fourth day.

How is it that they come away ſo eaſily? How is it thus poſſible, to remove them, without cutting open that ring of each ligature, by which the artery was encircled? What becomes of the interrupted part of the artery itſelf?—Surely it happens here, as in all other caſes, in which we apply a ligature, that the part intercepted by the ligatures is killed! Firſt, The pulſe ceaſes upon drawing the knot of each ligature, which proves that the ſides of the artery are compreſſed. Next, The intermediate piece of the artery is fairly killed, rots like a polypus tied in a nooſe; and, as a polypus fades on the ſecond, and drops away on the third or fourth day; in like manner, this artery decays, mixes with the pus, leaves the ligature ſlack on the ſecond, and allows them to be withdrawn eaſily by the fourth or fifth day. And moreover, it is very obvious, if the artery be thus cut acroſs by our ligatures, as fairly as the older ſurgeons cut it acroſs with their knife, that its two ends muſt each have adhered; otherwiſe, upon drawing away the ligatures, a hæmorrhagy muſt enſue. Mr. Petit warns us that even the ligature is inſecure; for if the ligature, ſays he, falls off before the clot within the artery be ſtrong in its office of ſtopping the artery, the artery will bleed: But this premature falling off of the ligature, which he apprehended, cannot happen until the ligature has done its buſineſs effectually; or in other words, one part of the artery will not rot, or give way, before the parts of the artery above and below the ligatures have adhered.

Perhaps the whole proceſs may be repreſented in few words. The ligatures operate, by making the ſeveral points of the arterial canal paſs through the ſeveral ſtages of inflammation, from adheſion in one point, to gangrene in another. The ſpace included betwixt the ligature falls into gangrene; the ſpace immediately under the ſtricture of each ligature adheres, (the ligature and the adheſion preventing the gangrene from paſſing higher along the canal); and by this inflammation extending upwards and downwards along the artery, its walls are thickened, and its canal obliterated a little beyond the ſtraitened point *. The adheſion

* We find the following account of this proceſs in Kirkland, p. 5. "An aneuriſm of the arm, being in great danger of burſting, obliged me to perform the operation: The impulſe of the blood againſt the ligature, at the time of the operation, was very great; and as a part of the artery (whoſe diameter was conſiderably enlarged) was expoſed, its pulſations were viſible; but upon removing the dreſſings the third day afterwards, the pulſation could neither be ſeen, nor felt nearer to the ligature than an inch and a half; whence I was led to conclude, that the artery had *collapſed* and *gradually cloſed* itſelf up to the neareſt lateral branches."

I have obſerved, after I had performed the operation for aneuriſm, that on the third day, no pulſe was to be felt at all in the wound; but I never conſidered this as in the leaſt wonderful, ſeeing how very probable it is, that by that time, the ligature muſt have cut acroſs the artery, the artery muſt have ſhrunk, and its canal muſt been obliterated conſiderably beyond the place to which it has ſhrunk. But there is alſo another thing particular that Mr. Kirkland, and Mr. White inſinuate upon all occaſions, that the artery is obliterated juſt up to the firſt inoſculating branch, and always up to it. Mr. White ſays,— "In the arm I have by me, on which the operation for aneuriſm had been performed, it is plain to a demonſtration by the injection, that

of the artery and obliteration of its canal, are, in aneuriſm as in amputation, or in other wounds, the only ſecurity againſt bleeding; and the ligature or compreſs is the only way in which ſuch adheſion can be enſured; and there needs no more than two ſhort rules on this ſubject, the tendency of which is very plain.

1. If we are to try it with compreſs, let it be chiefly in thoſe accidents, and in thoſe parts of the body, where we have a good reſiſtance, as in the temple, the wriſt, the tarſus or fore part of the foot, where we can feel the artery lying naked upon the bone. Let the compreſs be a firm and hard one, ſteadily applied, well preſſed with a roller, ſo fixed as not to permit one drop of blood to paſs along the canal of the artery, nor to eſcape from the wound; for that would defeat the intention. Let there be a tourniquet round the limb, and attendants appointed; for ſome have died during the night*. Let this compreſſion be continued thus

the artery was cloſed, both above and below the ligature, to the next lateral branch."

His preparation was at that time, the only one in exiſtence; "but I have now by me," the preparation from the arm of a man who had formerly had the operation for aneuriſm performed upon him, and it is ſo particularly like Mr. White's, that if I were to give a drawing of it, it would be thought to be a mere plagiariſm; but in this very curious point it differs, that the injection, though coarſely done, and in great hurry, has paſſed the great inoſculation, (for in my preparation there is but one great inoſculation to ſupport the limb), it paſſes it a full inch and a half, terminating in a blind ſac.

* We find, in the following tranſcript from Murray, two very ſingular things: In the firſt place, we find two patients allowed to die of bleeding, during the night, after ſome awkward attempt at curing the

ſteady till the fourth or fifth day, for that is the term which we find neceſſary for obliterating the artery and enlarging the inoſculations in aneuriſms of the arm; and it is ſufficient: for we find the dilated artery of the thigh itſelf, obliterated by compreſſion on the fourth or fifth day. Be bold enough alſo, if it be the great arterial trunk of the limb, to draw your rollers till the limb be abſolutely without pulſe, and cold: for this

aneuriſm of the arm, in which, according to the oldeſt faſhion, they had tried compreſſion not above the ſkin, with the hopes of ſaving their patients from the pains and horror of a bloody operation; but had firſt cut up the aneuriſmal tumor, and then inſtead of tying the artery with a ligature, had applied a compreſs, and applied it ſo inſecurely, that both the patients, from ſome unwary motion in ſleep, had bled to death during the night. This is his fact; and his opinion, as it is plainly implied in the following words, is very curious. "If your compreſſion be too powerful, in place of ſaving the artery, you will abſolutely obliterate the artery; but if you compreſs lightly with deſign of ſaving the artery, you are never out of danger of an alarming, or even fatal hæmorrhagy." This language very clearly implies, that Murray, like moſt others, expects from compreſſion not an obliteration of the artery, but thinks, as Heiſter did long ago, and Mr. Morrand more lately (Vid. Acad. des Sciences, Vol. V. p. 172. Octavo), that the compreſs, by ſuppreſſing the quick motion of the artery, heals the wound.

"Murray ſpeaks thus: Fruſtra itaque, ſi firmam compreſſionem inſtituimus, conſervationem arteriæ expectamus, in leviore autem, qualis ad ſcopum obtinendum requiritur, hæmorrhagiæ repetitæ quæ chirurgi animum quam maxime ſollicitant, atque etiam ægrum ad ultimam ſæpe metam detrudunt, vix evitari poſſunt, leviori ſub ſomno, motu brachii, quo compreſſio aliquantum fuit perturbata, binos ægros Montiſpeſſulani vigeſimo poſt operationem die, hæmorrhagia exitiali correptos fuiſſe, narravit cel. Præſes. (*viz.* Murray.")—Vid. Arvidſon Murray, p. 20.

operation with the compreſs, though apparently milder, is quite the ſame with tying the artery with the needle.

2. If it be your deſign to obliterate the artery by ligature, your buſineſs is more eaſily and ſurely, and rather more quickly done. You muſt ſee your bleeding artery fairly, tie it clean and clear of all ſurrounding parts; tie your arteries with ligatures well proportioned to their ſize, not clumſy and rigid, but rather ſmall, perfectly flexible, and moiſtened with oil, that they may glide eaſily; draw them pretty tight, ſo at leaſt as to lay the ſides of the artery in contact, and till you ſee a pulſe above your ligatures, and none below; but never draw them ſo as to run the riſk of cutting the artery.

Hence, I think, the general concluſion is, that if you underſtand the principle of your operation, and do it with the proper precautions, you will be ſure to make good your point, whether you tie, or whether

All authors have believed, that when they cured aneuriſm by compreſſion, or by ſponges, they healed the wound of the artery. Mr. Morrand of the French Academy, ſays in the following paſſage, that he cured an artery wounded with the lancet, in a manner very different from that in which we uſe the ligature. "I need not, ſays Mr. Morrand, mention the ſeveral precautions which I took after applying Mr. Broſſard's agaric to the artery." I ſhall only obſerve, that the pulſe, which was interrupted for twenty hours, returned at the end of that time, and that I cicatrized the wound in a month." "Je dirai ſeulment que le poulx intercepté a la main pendant environ vingt heures, ſe manifeſta au bout de ce temps la," &c. p. 168. I dare ſay my reader has a tolerable notion what this interruption of the pulſe means; and what Mr. Morrand was doing with his puff-ball.

you compreſs the artery; and this eaſy adheſion of an artery, I take to be the chief reaſon why every man hitherto has been pleaſed with his own little diſcoveries, and every ſurgeon is ſtill pleaſed with his own methods, whether they be or be not perfectly regular and correct.

But, in this great ſubject, there is yet more to do; for there are many accidents in which we cannot operate with the compreſs or with the needle, in which we muſt uſe the ſtyptics, puff-ball, or ſponge: And of courſe, it may be right to give you a ſhort account of theſe means of ſuppreſſing bleeding, for diſputes about the cauſes by which bleeding arteries are ſtopped are uſeleſs, and to thoſe who delight in them, endleſs; unleſs there were found ſome one Catholic authority, by which the points might be ſettled at once: But we ought to be chiefly deſirous of knowing the means by which this end is accompliſhed. Though there are four chief methods of ſuppreſſing hæmorrhagy, viz. cauteries, aſtringents, fungi, and the ligature, there is one only, viz. the ligature, that is abſolutely ſecure.

1. Burning Irons were uſed by the ancients, merely becauſe they knew of no other means of ſuppreſſing the bleeding; and we cannot wonder that the ancients were ſo curious in the degree of heat; or in the way in which it was to be applied; or in the ſhapes of their irons, which were conical, that they might

touch nothing but the point of the bleeding artery; nor in the choice of their metals, preferring ſuch as were ſuſceptible of only a moderate degree of heat: for if they heated their irons too little, they did nothing; there was no eſchar formed, and the bleeding was not ſtopped; if they burnt too much, the ſlough, though fully formed, fell off almoſt as ſoon as the iron was withdrawn. But let them burn ever ſo cautiouſly, the ſloughs were to fall off ſooner or later, and it made little difference whether they fell off on the firſt or on the ſecond dreſſing, on the fourth or on the eighth day; and as they were in continual fear of this, they never undid the wound, without having a tourniquet round the limb. At every dreſſing the patient was tormented with the irons, and at every ſucceeding dreſſing he loſt more blood, ſo that the laſt condition of that man was worſe than the firſt.

It was in thoſe times that the invention of a new cautery, or a new ſhape for the iron, was thought meritorious. It was then, alſo, that Fabricius ab Aquapendente, publiſhed his new method, as he calls it, of cutting out a cancerous breaſt: "For if it be a moveable cancer, I cut it away," ſays Aquapendente, "with a red hot knife, which ſears or burns as it cuts; but if it be a cancer adhering firmly to the thorax, I cut it, without either bleeding or pain, with a wooden or horn knife ſoaked in aquafortis, with which, having cut through the ſkin, I then do the reſt by digging out the gland with my fingers *." Theſe are methods

* Ego autem, etſi nil tale facere molitus ſum, ſi eſſem facturus, ut dolorem primo vitarem, et ſanici profuſionem, ſi cancer ſit mobilis, ip-

really deſerving of the encomium which Mr. Dionis put in the author's name. "They have chiefly the merit, ſays Dionis, of killing two birds with one ſtone." "On ferait d'une pierre deux coups *."

But it muſt not be forgotten that there are caſes where even this horrid method may yet need to be uſed, as in bleedings from the gums, cheeks, pallate, or tonſils, or other parts within the mouth.

2. The Styptic Solutions, powders and doſſils of various kinds, came next into uſe; for ſurgeons practiſing chiefly the actual cautery or hot iron, were naturally led next to think of the various ſubſtances, which are uſually called Potential Cauteries, and which are chiefly metallic or earthy ſalts, as ſilver cauſtic, vitriols, corroſive ſublimate, alum, or the mineral or vegetable acids; which are, when diluted, gentle ſtimulants, or as they are called, aſtringents; exciting contraction of the veſſels, and forming coagula upon the bleeding ſurface. Before ſurgeons came to uſe the needle freely, they often truſted to cauſtics; but in uſing buttons of vitriol, or little bags

ſum forcipe hoc apprehenſo ſtatim cultro, uno eodemque tempore candente et incidente opus peragerem, ut forcipe valide conſtrigente ſenſus partes hebetetur, cultro incidente amputetur cancer, et eodem candente ſanguis ſupprimatur. Quod ſi cancer mamillæ adherens et firmus ſit, neque ſtringi poſſit, excedendus omnino eſt, atque ad vitandum et dolorem et profuſionem, excederem cum ligno aut cornu, aciem habente intincto tamen ſubinde in aqua illa, qua aurifices ab argenteo aurum ſeparant, quam fortem vulgus nominat, quo tota cutis in circuita mammillæ incidenda eſt, poſtea digitis potiſſimum et unguibus mammillæ glanduloſa ſubſtantia à ſubjecta parte ſeparanda.

* Dionis, page 362.

of it in powder, applied to the end of each artery, they found that by this method alſo, the end of the artery was deſtroyed, as by the burning irons, and ſloughed off, and required the application of the tourniquet, every time that the dreſſings were undone, and at each dreſſing, the application alſo of new vitriols. Even after they came to uſe the needle freely, it ſeemed to be a harſh method, Surgeons were ſtill hoping to find ſome leſs painful one; which eaſy and credulous temper in men of our profeſſion, has given the tone to thoſe unacquainted with ſubjects like theſe, and has left the public ever credulous, open to the practices of quacks, and noſtrum-mongers. We have now tolerable ſpecimens of all that can be produced from the vegetable or mineral kingdom, to ſerve as ſtyptics, and find them good for nothing; we know that no acid, ſpirituous, nor ſaline body, ever acts as a ſtyptic, without cauſing pain; what then ſhould we expect from the random inventions of ignorant people, whoſe only trade is that of cheating the public, and whoſe only ſkill is that of contriving or managing the deceit? What have we, who can manage every thing by compreſſion, or with the needle, to do with ſtyptics? Or why ſhould we ſuffer this continual ſucceſſion of traſhy compoſitions, under the title of vulnerary balſams, ſtyptic ſolutions, ſtyptic powders and the like? Since, from the time of Rabell, down to the celebrated Ruſpini, we have found diſappointment come quick after each fit of anxiety and expectation; and ſince we have much reaſon to believe, that the beſt of theſe are little elſe than acids, ſpirits, turpentine, or trifling ſolutions of ſome aſtringent gum.

Rabell was a German chemiſt, and having come to Paris with his ſtyptic, he ſo wearied the king, and Mr. Louvais, with entreaties and ſolicitations, that after long attendance, he obtained leave to uſe it upon one of the ſoldiers in the Hoſpital of Invalids. This poor man's leg having been amputated in the uſual form, the ſurgeons and phyſicians of the hoſpital, delivered him up to Mr. Rabell, who had hardly finiſhed the firſt application of this ſtyptic, before the blood came draining through all the dreſſings. He doubled the doſe of his ſtyptic water, dreſſed his ſtump firmly a ſecond time, but ſtill the blood flowed *; ſo that in a little while, and in preſence of all the aſſiſtants, the unhappy ſubject of this cruel experiment, died under his hands; either they had not had that fear, which they ſhould have had for the patient's life, or they wanted humanity or reſolution enough to ſtop this horrid experiment; but they made ſome amends by procuring an order from the king, prohibiting Rabell, under the ſevereſt penalties, from repeating this attempt.

We have ſeen the lateſt of theſe inventions, Ruſpini's ſtyptic, tried in this place, where I believe it is eſteemed as of much the ſame value, withthe ſympathetic powder of that famous Knight and moſt complete Gentleman, Sir Kenelm Digby; which ſympathetic powder ſtaunched the blood, as effectually when it was applied to the weapon, as when applied to the wound itſelf †.

* This Eau de Rabell, ſo famous in France and Germany, was juſt a mixture of ſtrong ſpirit of vitriol, and ſpirits of wine.

† This I believe is the ſame Knight, whoſe gallantry and loyalty carried him to ſuch an exceſs, that he burſt the arteries of his legs, ſo

But here alſo it muſt be remembered, that though no ſtyptic, waſh, or powder, is to be put in competition with the needle, nor to be uſed in amputation, or in any great wound; ſtyptics muſt be uſeful in all internal hæmorrhages, as from the noſtrils, throat, alimentary canal, &c. or in any broad bleeding ſurface, where no particular artery be can ſeen.

3. The AGARIC of the OAK was firſt uſed about fifty years go. It is a fungus growing upon old oaks. It is gathered in Auguſt or September; is prepared by long keeping in a dry place, cutting away the outſide rind, beating it till it ſoften, ſo that it begins to yield, and can be torn with the fingers. It is of the colour and appearance of chamoy leather, but ſpongy and looſe; in the country parts of Ireland, it is actually called oak-leather. A piece of this fungus, put down and ſettled with a compreſs and bandage over the mouth of any wounded artery, does preciſely the office of a piece of a ſponge: And as for the

as to form aneuriſms, by kicking open the doors of the den in which the boar was confined, which the King was to hunt; but whether his aneuriſms needed to be opened, or whether he uſed his ſympathetic powder, or whether he applied it to the door, or to his own hams, the German writer who tells this ſtory, does not declare.

"Vidi equitem Digbeum, amicum intimum, egregium philoſophum, chimiſtam, cujus præſcripta medica curioſa typis mandata Pariſiis, a Trefelio mihi dicata fuere; exortæ illi fuere venæ et arteriæ variceformes in tibiis, cum pedum impulſu conaretur inſringere foresſepti ferarum, quibus Rex Angliæ adſtabat, quocum venatum ibat: Forte contigit in eo occurſu ut tunica arteriarum media crepuerit, ipſa autem arteria admodum dilatata; tunc temporis tumor longitudinem arteriæ inſequitur, in extenſione vim patientis."—Zodiac. Med. Gall. p. 45.

character of this particular remedy, I ſhould ſay, that had it been invented in the days of Celſus, when they were cutting off limbs, not with the aſſiſtance of the tourniquet, but by the gripe, (i. e. by aſſiſtants graſping the thigh), when they were ſearing the arteries with their burning irons, it muſt have been of infinite value, and muſt have ſaved many lives; but coming as it did in competition with the needle, it muſt have delayed the general uſe of the needle, and muſt no doubt, have endangered many lives, and was in no reſpect worthy of the high praiſes beſtowed upon it by the Academy of Surgery, nor of thoſe liberal rewards, which the King of France beſtowed upon Mr. Broſſard. The privilege of rewarding merit is no doubt a high one; but I fear that ſuch rewards, are rather a general bribe, for the concealing of uſeful inventions; while an invention really uſeful, will be in the ſame degree honourable; and in our profeſſion, moſt of all, every uſeful invention will reward itſelf.

4. The Sponge, which has been uſed chiefly by the celebrated Mr. White, is more uſeful than the agaric; it is like it in its operation, is really of value in practice, not to take precedency of the needle, but to aſſiſt it. The ſponge can be very thoroughly dried, it can be compreſſed into a very ſmall compaſs, it can take any ſhape, and may be thruſt down into cavities and narrow wounds, where the needle cannot go, it can be made ſo hard, and preſſed ſo firm, by laying compreſſes over it, as to have at once the effect of a compreſs and of a ſponge; or rather of a compreſs having this cu-

rious property, that at firſt it preſſes moderately, but if one drop of blood eſcapes, that blood is abſorbed, ſo that the compreſs ſtill preſerves its contact with the bleeding artery, and ſwells and preſſes harder exactly in proportion as ſuch preſſure is required.—This plainly is the effect of a ſponge, whether it be nitched in betwixt two bones to compreſs an artery which the needle cannot reach, or whether it be laid flat upon an open ſore, as after cutting out the breaſt, or after an amputation done according to the old faſhion, where the ſurgeon uſed to dreſs his ſtump open, and to heap compreſſes tied with a firm bandage above each piece of agaric or ſponge. The agaric poſſeſſing a degree of this property is of uſe; even our common charpie poſſeſſes this quality of abſorbing and ſwelling in a ſlight degree. But the agaric and ſponge are both ſo excellent in this reſpect, that even thoſe who are the leaſt inclined to uſe them, muſt acknowledge, that though the agaric will often fail, it has yet enabled ſurgeons to perform the greater amputations, as of the thigh, ſafely, without uſing the ligature, as is excellently proved in the trials by Mr. Warner, at the deſire of the Royal Society, as well as by the inventor, aſſiſted by Meſſrs. Fagel, Bouquot, and Morrand, in France. And the ſponge, as is proved by Mr. White's practice, is the only thing that can ſtand by the ſide of the ligature to aſſiſt it. I am ſenſible, that by thruſting down a ſponge, I have ſaved a patient's life, when I am not ſure that I could have extricated myſelf by any nicer operation *.

* The chief Papers, upon this ſubject of the uſe of the fungi, of

This point, then, of the value of the agaric, bovista, puff-ball, (or by whatever other name various surgeons have known these fungi), and of the sponge itself, without further explanation, can be easily settled thus.—Had they been discovered in the times of the old surgery when cauteries were used, they must have saved many lives: But now when we know well how to use the needle, they cannot come at all in competition with that surer method. The thrusting down a sponge into any wound, is absolutely inconsistent with our common intention of immediately reuniting that wound; and the tying of arteries must, in amputations, in aneurisms, and in all simple wounds, be preferred, for two reasons, both as it is the surer method, and as the ligatures of the arteries hang out from one corner of the wound, and do not hinder us from reuniting or even from sewing it up.

The use of the sponge is plainly limited to the cases of difficulty or danger.—Of difficulty, as where we

puff-ball, agaric, fungus vinosus, (a fungus that grows in wine cellars), &c. may be seen in the Philosophical Transactions, or in the Academy of Sciences, about the year 1756; and there will also be seen, some indications of the confused notions they had about these fungi; considering them not merely as sponges, but as containing some hidden inexplicable virtue in restraining hæmorrhages: this is best understood by the experiments of one man, who resolving to be very wise,—or like a true SOCIETARIAN,—(as Dr. Hill would have said), BOILED IT!! "I have tried it, says this gentleman, in female cases, with *great success*, by injecting a STRONG DECOCTION of this fungus into the womb, in hæmorrhages from the womb, and especially in fluxes, after delivery." Vid. Philosophical Transactions, p. 265.—He had better have injected a STRONG DECOCTION of Album Græcum.

cannot ſee the bottom of a deep wound; where we cannot ſee the bleeding artery; where we dare not cut far down to the artery, on account of the nearneſs of ſome other great artery or important nerve; where we cut forwards with the knife, and would not willingly uſe the needle by making a plunge in the dark.—Or of danger, as when it happens, as it ſometimes does, that the needle has already failed; where the bleeding is from the head, or in the trunk of the body, and is not to be commanded by a tourniquet; where we do not mean to heal by adheſion, or where the danger from bleeding is ſo great, as to put out of the queſtion all trivial conſiderations about the quick healing of the wound;—where the bleeding is very furious at the bottom of ſome deep wound, filling it with blood, ſo as to hinder us from ſeeing the bleeding artery, and preventing us from uſing the needle, or, at leaſt, preventing us from uſing it deliberately or ſafely; or where the bleeding is from ſome general ſurface, and not from one particular artery which can be ſeen, and tied; or where, though the artery can be diſtinctly ſeen, it lies among putrid fleſh, and is itſelf ſo putrid, in a gangrenous and foul cavity, or on the ſurface of an unhealthy ſtump, that the needle either cannot be uſed, or will not keep its hold.———Theſe are the difficulties and dangers, which force us to retain the ſponge, though we prefer the ligature.

Laſt of all, the LIGATURE of the ARTERIES was invented by the celebrated Paræus, who was firſt ſurgeon to four ſucceſſive kings of France. His high fame

deſcending thus for ages, muſt make you deſirous of knowing what was the real character of the man; and there is no one point upon which his character turns ſo much as this ſingle invention: for of all the improvements of his practice, this of tying arteries was that of which he was the proudeſt, venturing to ſay, "For the good of mankind; and the improvement and honour of ſurgery, I was inſpired by God with this good thought." And as it was the higheſt of all his improvements, it was that for which his enemies envied him the moſt.

The fortune of Paræus was very ſingular; he was at once the chief ſurgeon, the counſellor, and the private and familiar friend of four ſucceſſive kings of France. He attended them in their retirements and looſer hours, he followed them into the field, through all thoſe dangers which were in thoſe days part of the duties of a king; and which his writings diſplay to us, with a faithfulneſs and minuteneſs of deſcription which the hiſtorian ſhould hardly diſdain. He had the good fortune on one occaſion to ſave manifeſtly the life of the king, when his arm had been ſo hurt in bleeding, that it was three months before Paræus could accompliſh the cure. And this man was of ſuch rare abilities, and ſo much valued by the king, that he alone was ſaved alive in that horrid maſſacre of St. Bartholomew's day, which remains an eternal blot upon the French name.

But of all his good fortune, this is the moſt remarkable, that it was he alone, who, by his influence over the king, put a ſtop to this unparalleled butchery,

after it had continued in all the quarters of Paris during two days—The feelings of the king after thoſe dreadful days of carnage and moſt facrilegious murder, and the familiar and even tender manner of his complaining to Parœus, are told by the Duke de Sully very feelingly; for he was himſelf of the Reformed religion, and though yet a child with difficulty eſcaped.

* "The hour is now come, ſaid the king, when all France ſhall be of one religion." "Now, by God's light Sire, (replied Parœus), I think you will never forget your promiſe to me, that there were four things you would never force me to do:—To enter again into my mother's womb;—to go out in the day of battle;—to leave your ſervice;—or, to go to maſs. —The king then took him aſide, and opened up to him the troubles with which his ſoul was diſquieted.

* "Que ce Prince lui ayant dit le jour du maſſacre, qui c'etoit à cette heure, qu'il falloit que tout le monde ſe fit catholique. Parée lui repondit ſans s'etonner: Par la lumiere de Dieu, Sire, je crois qu'il vous ſouvient m'avoir promis de ne me commander jamais quatre choſes; ſçavoir, de rentrer dans le ventre de ma mere, de me trouver a un jour de bataille, de quitter votre ſervice, et d'aller à la meſſe." Le Roi le prit a part, et s'ouvrit a lui ſur le trouble dont il ſe ſentoit agité. "Ambroiſe, lui dit-il, je ne ſçais ce qui m'eſt ſurvenu depuis deux ou trois jours; mais je me trouve l'eſprit et le corps tout auſſi emus, que ſi j'avois la fievre. Il me ſemble a tout moment, auſſi bien veillant que dormant, que ces corps maſſacres ſe preſentent a moi, les faces hideuſes et convertes de ſang: je voudrois bien qu'on n'y eut pas compris les imbeciles et les innocens." L'Ordre qui fut publié le jour ſuivant de faire ceſſer la tuerie, fut le fruit de cette converſation. —Sully, Liv. I. p. 33.

———" Ambroſe, ſays he, I know not how it is with me, but it goes ſo heavily, that within theſe three days, I am as in a fever;—indeed I am ill, as ill in mind as in body; ſleeping or waking, the murdered Hugenots are ever before my eyes, with hideous faces weltering in their blood.—Would to God the children and the aged, at leaſt, had been ſpared!" The order for ſtopping the maſſacre, which was proclaimed the following day, was the reſult of this converſation.

There had long been an open war, about privileges and dignities, betwixt the ſurgeons and phyſicians; and that was one cauſe of ſettled malignity and diſcontent. That Paræus, a ſurgeon merely, ſhould venture to write ſo large a book on ſurgery, and ſhould make it, according to the groteſque taſte of that age, a good and learned book, was high matter of jealouſy and offence, and for this reaſon alone, was Paræus accuſed of ignorance in the Latin language, and of hiring young phyſicians, (as if young phyſicians ſhould be more capable in ſurgery, than old ſurgeons), to write his books. That Paræus's abilities ſhould have raiſed him to ſtations of honour, or made him thus familiar with a race of princes not too apt to condeſcend, muſt have been a ſore grievance to all his enemies, or which is the ſame, to all the phyſicians; but moſt eſpecially, to ſuch a man, and ſuch a phyſician as Gourmaline, whoſe taſte in learning and in manners, and whoſe habits of mind, are beſt explained, by ſhowing the kind of language, with which he aſſaulted Paræus.

" It was then very forward, raſh, and preſumptous,

in a certain perſon, to venture upon condemning the cauterizing of bleeding veſſels (after cutting off a mortified limb), a method ſo highly and continually commended and approved of by all the ancients; teaching in oppoſition to that, without any authority, without knowledge, without experience, without good ſenſe, ſome new method of his own, of tying arteries and veins." And in the end, he proceeds to call him carnifex, and other names, which it is needleſs to repeat *.

Paræus, familiar as he was with Kings and Princes, was not to obſerve the very ſtricteſt rules, with an antagoniſt like Mr. Gourmaline; but in the anſwer which he made to this heavy charge, we perceive, through his ſharp reproof of Mr. Gourmaline, mixed as it is with indelicacies, which the faſhion of the time gave countenance to, the natural good ſenſe, and the right education of Paræus, and the true grounds on which his character was founded; which laſt he explains to us with a confidence and ſteadineſs, well becoming ſuch a man †.

* Male igitur et nimium arroganter, inconſultus et temerarius quidam vaſorum uſtionem poſt mortui membri reſectionem, a veteribus omnibus plurimum commendatam et ſemper probatam, damnare auſus eſt: novum quendam deligandi vaſa modum contra veteres omnes medicos ſine ratione, experientia, et judicio, docere cupiens, nec animadvertit majora multo pericula ex ipſa vaſorum deligatione (quam acu partem ſanam profunde transfigendo, adminiſtrari vult) imminere, quam ex ipſa uſtione.

† Davantage vous dites, que vous me monſtrerez ma leçon aux operations de chirurgie; il me ſemble que ne ſçauriez, parceque je ne l'ay pas appriſe ſeulement en mon eſtude; et par avoir ouy par pluſieurs

" You boaſt moreover, Mr. Gourmaline, that you will teach me my leſſons in ſurgery, and my operations; but in that I believe, you are a little miſtaken; for my education has been quite after another faſhion. I have learnt my art, not in my cloſet; no, nor by hearing the diſcourſes of phyſicians, though that alſo, I have not deſpiſed; but in the Hotel Dieu, where I lived for three years, ſeeing many diſeaſes, and learning many operations upon the living body: and learning alſo much of the anatomy upon the dead; and of this I truſt I have given ſufficient proofs in the public ſchools."——" But I have yet more to boaſt of; for, being called into the ſervice of the kings of France, I have in my time, ſerved four ſucceſſive kings, and I have followed them in battles, and in ſkirmiſhes, and aſſaults; ſometimes alſo blocked up with the beſieged, curing their wounds."—" And laſt of all, I have lived in this great and famous city of Paris, many long years, where, thank God, I have been held in ſome repute, and ranked at leaſt equal with my peers; in ſo much, that there have been few difficult, or famous cures, in which my head and hand have not been employed.—How! ſeeing theſe things, dares ſuch a man as

et diverſes années les leçons des docteurs en medecine: mais comme j'ay eſcrit cy-devant en l'epiſtre au lecteur, j'ay fait reſidance en l'Hoſtel Dieu de Paris par l'eſpace de trois ans, ou j'ay eu moyen de voir et apprendre beaucoup d'œuvres de chirurgie, ſur une infinité de malades, enſemble l'anatomie ſur une grande quantité de corps morts, ainſi que ſouvent j'en ay fait preuve tres ſuffiſante publiquement aux eſcoles de medecine de Paris, &c.

you, who have made ſurgery no part of your ſtudy, talk of teaching me * ?"

* It may not be amiſs, to infert the following quotation, as a ſpecimen, of the manner and language of thoſe times, and I am directed to this paſſage, by a good mark, the Marginal Index; where I find the following ſharp taunt, entitled by Paræus, "Belle Similitude." P. 781.

"You remind me, Mr. Gourmaline, of a little ſcrubby boy, who had come from lower Brittany to Paris forfooth to learn French; and one day the organiſt of the great church of Notre Dame, found him lounging about one of the gates of the Palace, and took him to blow the organ. After three years, this little round fat-arſed fellow, (bien feſſu et materiel,) finding that he had learned not one word of French, returned to his father: telling him that now he could ſpeak good French, "and beſides Vather, ſays he, I can play upon the organs," (et lui dit quil parla bonne Français et davantage qu'il ſcavoit bien jouer des orgues). The father quite delighted with ſuch a ſon, goes ſtraightway to the organiſt of their great church, "Do, ſays the father, let my ſon try the organ; for I long to know whether he be ſuch a proficient as he ſays he is." The organiſt very obligingly went along with them, and the boy having got into the organ, preſently claps himſelf down by the bellows, with a ſort of inſtinctive jump. "Why, what's this ſays the organiſt with great ſimplicity?"—"O nothin, ſays the boy, only you had beſt play upon the organ, for I play beſt upon the bellows." "Now I tell you, Mr. Gourmaline, that you have been all this while playing upon the bellows, while I have been playing upon the keys; it is a vaſtly eaſy matter, for a fellow like you to heeze upon his chair and prattle about it; but performing ſurgical operations with the knife in hand, is quite another affair." P. 781.

Partant, il eſt à croire, que n'avez jamais ſorty de voſtre eſtude, que pour enſeigner la theorique (ſi vous l'avez pû faire) les operations de chirurgie s'apprennent a l'œil et au toucher. Je diray que vous reſemblez à un jeune garçon Bas Breton, *bien feſſu et materiel*, qui demanda congé a ſon pere pour venir à Paris prendre France. Eſtant arrivé,

You may ſee by this introduction, (for this is the introduction to the book, which he calls his Apology, and his Voyages), that he prepares to defend his invention of the tying of arteries, with true ſpirit. He both defends it practically, and he alſo defends it learnedly; for he was required to prove, that the principles, at leaſt, if not the abſolute practice of this operation was to be found in the writings of the ancients; but after all his ſearching among the works of Galen, Celſus, Avicenna, and the reſt, we find him happily unable to produce any ſuch authorities, as might hurt his own claim to the diſcovery, or benefit his cauſe.

But he proceeds next, in a ſtyle more natural to him, to prove it by facts; by his amputations, and other operations, and by his doings in other dangerous wounds, atteſted by his aſſiſtant ſurgeons, men of the

l'organiſte de Notre Dame le trouva à la porte du palais, qui le print pour ſouffler aux orgues, ou il fut trois ans. Il vid qu'il parloit aucunement François, il s'en retourne vers ſon pere, et luy dit, *qu'il parloit bonne France, et davantage, qu'il ſcavoit bien jouer des orgues.* Le pere le recent bien joyeux dequoy il eſtoit en ſi peu de temps ſi ſçavant; il s'en alla vers l'organiſte de leur grande egliſe, et le pria de permettre à ſon fils de jouer des orgues, a fin de ſçavoir ſi ſon fils eſtoit bon maiſtre ainſi qu'il diſoit; ce que le maiſtre organiſte accorda voluntiers. Eſtant entré aux orgues, il ſe jette de plein ſaute aux ſufflets, le maiſtre organiſte lui dit, qu'il jouait, et que luy ſouffleroit; alors ce bon maiſtre reſpond, *gu'il jouait luy meſme des orgues s'il vouloit; car quand a luy il ne pouvoit jouer que des ſouffiets.* Je croy auſſi; mon petit maiſtre, que vous ne ſçavez autre choſe que caqueter en une chaire; mais moi je joueray ſur le clavier et ferai reſonner les orgues; e'eſt a dire, que je ferai les operations de chirurgie, ce que ne ſçauriez nullement faire pour n'avoir bougé de voſtre eſtude et des eſcholes, comme j'ay dit.

higheſt name, and eſpecially by Guillimeau, who then lived in the houſe with him, as a pupil, and who acquired in the end, a character worthy of his breeding: But what moſt of all delights me, is to obſerve, how perfect the ſyſtem of Paræus's practice was, in reſpect of hæmorrhages and the ſecuring of arteries.

"If there be a bleeding artery, ſays Paræus in any wound, dreſs the wound with aſtringents; but be careful at the ſame time, to lay a firm compreſs over the wound, and ſettle it well with a bandage, and then lay out the wounded limb, in an eaſy way."

"If this do not ſerve, clap your finger upon the point of the artery, and wait patiently till a clot be formed."

"If the artery ſtill bleeds, cut up the wound, if it have been ſewed, and paſs a needle under the artery, taking up with it in the ligature, much or little fleſh, according to the circumſtances of the caſe."

"If the artery have ſhrunk up among the fleſh, cut up the wound above the artery, and tie it."

"But ſhould both ends of the artery have been ſtill further retracted, then continue your inciſion, and cut open the ſkin freely, ſtill purſuing the artery; but ſtill careful of the very artery that you are purſuing, leſt you ſhould cut it a ſecond time."

"In an amputated ſtump, draw your arteries out with the forceps, tie them neatly with a thread; but if once you miſs the artery, or your firſt thread give way, do not uſe the forceps any more; but paſs a needle four inches long into the ſtump, ſo as to tie in the artery, along with much of the fleſh."

This is a ſyſtem of inſtructions, which is fairly extracted from Paræus's books, without mending the text, and though this ſyſtem be now one hundred and fifty years old, it is ſuch as I believe, the beſt ſurgeon at this day in Europe could hardly improve; for in correctneſs of practice, ſurgeons from his time, went backwards for many ages, (at leaſt, in this point); nor did they argue, becauſe their judgment was not convinced; but, on the contrary, it was by arguing upon a plain point, that they unſettled their judgments; for, from the moment that they began to argue, this part of practice ceaſed to improve; monſtrous fancies haunted their imaginations, which ſome were glad to turn into arguments againſt a new practice; while others were really afraid. Firſt, They were afraid, leſt the ligature ſhould give way, and they ſaid it would cut acroſs the artery; it would make the end of the artery mortify; it might be thrown off by the continual beating of the artery, ſo they ſtitched it up and croſs-tied and knotted it, and took all kinds of ſecurity. They not only tied one ligature round the artery, but they at the ſame time transfixed it with a needle, and then twiſted together the knots. Then like children, afraid of what they had done, they feared leſt this firm tying of the artery, ſhould occaſion locked jaw, or univerſal convulſions; ſo that on their amputation table, was produced nothing ſmaller than tapes, and their needles, which were three or four inches long, were carried round each artery, at the diſtance of an inch. It is only after much experience, and by very ſlow degrees, that we have

learnt at laſt, that the drawing out an artery with the forceps or tenaculum, and the tying it clean with a ſmall ligature, the method which appeared to the older ſurgeons to have every fault, is abſolutely the moſt ſecure *.

RULES

FOR STOPPING THE HÆMORRAAGY FROM ALL SMALLER ARTERIES.

1. Styptics can avail us very little in any dangerous hæmorrhagy, and they ſtand in our liſt, chiefly becauſe they were valued by the older ſurgeons, who, though they uſed the needle, never could rid themſelves of all their prejudices, and uſe it freely. With us ſtyptics are of little value, ſo that we never think of uſing them, except in bleedings from arteries of the very ſmalleſt ſize; where the hæmorrhage is of ſo little danger, that we would not trouble our patient with the ſharp pain, which the needle cauſes; we do not uſe them where we ſee the bleeding artery, or

* There is a defect in the common ligature, made with the needle, which has not been ſufficiently obſerved; for not only is there always much fleſh included along with the artery, which fades, ſo that the artery is again free; but the ligature paſſed with the needle, does not go round the artery in a circle, but up on one ſide, and down on the other, in a ſcolloped form, which gives a double effect, to this unavoidable fading of the parts; but yet this is a trifle to the general queſtion.

where we can uſe the ligature, or the compreſs; we find them uſeful, chiefly in oozings of blood from hollow paſſages, as in bleedings from the noſtrils, the gums, the throat, the womb, the alimentary canal, or in bleedings from foul ulcers, from the cavities of deep ſores, or from any broad and diſeaſed ſurfaces, where the bloody exudation may be checked, and the condition of the ſurface mended at once, by the ſtimulant nature of our ſtyptics. The beſt of which are diluted vinegar, or ſpirits, or mineral acids, or ſolutions of alum.

2. There are alſo caſes, where we ſhould chooſe to diſregard the bleeding from the ſmaller arteries; even though they be of ſuch ſize, as to be ſeen throwing out their blood by jets; we perform few operations, in which we do not ſee little arteries throwing out their blood, which before we have finiſhed our inciſions, have ſhrunk; and have injected the cellular ſubſtance round about them, ſo that it is thickened, and their mouths are cloſed. Such arteries are no more heard of, and the cure goes on well. And, in like manner, we often ſee little arteries opened, in wounds which we diſregard altogether, we allow them to exhauſt themſelves; keep the wound expoſed to the air; and when the bleeding and general oozing relents a little, we clean the wound; or we at leaſt take away the groſſer clots of blood, which might prevent the reunion of the wound. Then we lay the lips of the wound together; and then we lay our compreſſes in ſuch a manner, as to preſs the lips of the wound to each other, and to preſs the cut ſurface of the wound

to the bottom of the wound; ſo that theſe compreſſes, which thus procure the adheſion of the wounded ſurfaces, prevent, at the ſame time, any further bleeding within. The bandages of ſuch a wound ſhould be painfully tight at firſt, and may be ſlackened in a few hours.

3. In all hæmorrhages, where we have a full and rather dangerous bleeding, and in which we ſee diſtinctly one or two great arteries or veins throwing out blood, the bleeding muſt be ſuppreſſed either by the ligature, or by a ſteady compreſs, and the ligature, wherever we can uſe it eaſily, ought to be preferred.

4. If an artery of a ſmaller order, and lying firm againſt ſome bone, as in the hand, or foot, or temple, be cut; or, if either by ſtabs, a ſmall aneuriſm be formed, as in the wriſt, or at the root of the thumb; or if by a blow, the artery be hurt againſt the bone, and burſts, ſo that a ſmall beating aneuriſm enſues; in ſuch caſes we do not always go regularly to work, nor do we chooſe to give the patient the pain of opening ſuch a tumor; but ſometimes by departing from the general principle, we manage the particular caſe more eaſily, by applying a compreſs, which, being tied down hard and firm for two or three days, obliterates the artery, by flattening it againſt the bone. The blood of ſuch a trivial aneuriſm is as eaſily abſorbed, as that bloody tumor is, which we ſee ſo often on the heads of children immediately after birth. It is juſt by ſuch a compreſs, that we ſtop the Temporal Artery, after opening it with the lancet.

5. The manner of making compreſſion to obliterate an artery, muſt vary according to the circumſtances of the caſe: Sometimes, as in aneuriſms, it ſhould be made above the ſkin, and on that part of the artery, where it is juſt entering into ſome ſmall aneuriſmal bag, and the artery which feeds the aneuriſm being thus obliterated, the blood already extravaſated will be abſorbed, and the little tumor itſelf will quite diſappear, leaving but a little thickening, or perhaps none. Sometimes, as in wounds, we make the compreſſion within the wound, cleaning it, looking for the place where the artery is, and perhaps there can be no better nor firmer compreſs, than a ſmall pellet of chewed paper, a piece of cork, a piece of folded leather, a piece of firm ſponge or agaric, a firm compreſs of folded linen; any thing will do for a compreſs, if it be but firm in itſelf, and neatly applied. The compreſs interrupts the cure by adheſion but for a few days: for when it is withdrawn on the ſecond or third day, the parts may then be laid down ſo as to adhere.

6. But the arteries of the wriſt, the palm of the hand, the fore part of the foot, &c. are of ſo great a ſize, that though when bruiſed, or hurt, or ſtabbed, and the ſkin healed over the hurt artery, the aneuriſm is commonly of a trifling ſize, and eaſily cured; yet theſe arteries being cut by working tools, a carving knife, &c. in the wriſt or the foot of a large and ſtrong man, there enſues a ſcene of terrible confuſion and perplexity; which perplexity, is itſelf the chief cauſe of ſuch loſs of blood, as often injures the con-

ſtitution, when it does not endanger the life: for the friends gather up napkins and cloths confuſedly, wrap them looſely and in a hurried way round the limb, and each cloth, as ſoon as it is ſoaked in blood, they remove, as if they had no other intention than the childiſh one of hiding from the patient what quantities of blood he is loſing; while, if in place of this general preſſure of cloths wrapped round the limb, they could have but the boldneſs to look upon the bleeding wound, and preſs upon the very point where the artery were bleeding, they might with one finger only ſuppreſs it, and with a ſingle touch. Then, let the recollection of this be a leſſon to the ſurgeon, and let the very ſight of this confuſion put him in mind of his duty, which is to whirl off thoſe confuſed bloody cloths as quickly as poſſible, and preſs the point of his thumb or finger directly upon the bleeding veſſel.

7. The bleeding being thus reſtrained, let the ſurgeon clean the limb, appoint his aſſiſtants, lay the hand upon a table and pillow; or if it be the leg, lay it out firm upon a ſtool. If he have no good aſſiſtants, let him make a temporary tourniquet with a common garter, and any ſtick; but if he have any profeſſional man to help him, then he ſhould ſtill prefer the ſuppreſſing of the bleeding with the point of his finger, becauſe in a moment he can let go the artery with one jet,—can cloſe it again as ſuddenly; in ſhort, he can let go the bleeding artery more quickly, and can ſee it oftener and with leſs loſs of blood than in uſing the tourniquet. Having thus fixed his eye upon the bleeding artery, he either draws it out with the hook

or forceps, or he ſtrikes his ligature under it with the needle; or if neither of theſe can be done, then he puts either a regular tourniquet, or this occaſional tourniquet round the arm, and cuts up the wound freely, till he ſees the artery bleeding with open mouth.

8. Whatever blood the patient loſes before a ſurgeon arrives, is part of the natural danger of his wound; but it is a great diſhonour to the ſurgeon, if he loſe much blood after he arrives. Succeſſive bleedings, ſucceſſive divings with the needle, the taking in of arteries, tendons, and nerves, all in one great ligature, and hæmorrhages ſtill ſucceeding to theſe clumſy operations, are far from being honourable for the ſurgeon, eſpecially ſince theſe wounds of the fore arm, or leg, or hand, or foot, are in parts where we may uſe greater freedom. The ſurgeon, then, ſhould do his operations boldly; he ſhould not be ſparing in his firſt inciſions, (if he have but knowledge enough of the croſs ligaments, tendons, and nerves, to make ſuch inciſions ſafely): for if once he ſuffer this wounded artery to aſſume an aneuriſmal form; if he oppoſe the blood by ſlight compreſſes, ſuffering it all the while to bleed within; the artery will ſhrink, the cellular ſubſtance be crammed with blood, and the ſkin be thickened by inflammation alſo; the ſeeking out of the artery among ſuch a confuſion of parts, will be inconceivably difficult: both becauſe the artery does not bleed ſo as to direct us, and becauſe it lies deep, and becauſe the ſurgeon cuts very timorouſly; for even a bold man will be apprehenſive when he finds himſelf cutting through

parts which he does not underſtand. And, in this particular caſe, the parts are ſo maſſed together, that he can diſtinguiſh no one part from another, unleſs he prolong his cut either above or below the place in which the blood is extravaſated where the arteries are free; in ſhort, as he cuts through two inches of confuſed ſubſtance, and on ſo naked a part as the wriſt, (*e. g.*) he hardly doubts that he is cutting through muſcles and every thing, while in fact he is cutting only through the ſkin, thickened to this degree by inflammation that has laſted for two or three days, and by the continual driving of the blood.

The rule which ariſes out of this repreſentation of the caſe is very plain, *viz.* not to be ſparing in the firſt inciſion; to do this firſt and great point of the operation decidedly and boldly. The leaving no doubt about the tying of the artery, and no poſſible occaſion for future inciſions, is in the end the greateſt ſaving of pain; the firſt operation is eaſier than the ſecond, and the ſecond operation is eaſier than the third. It is owing to this lenient practice of making a ſmall inciſion at firſt that any ſecond operation is ever required: It is owing to a want of ſtill greater boldneſs in the ſecond operation, that a third is ever required; and we know too well, how often a want of ſucceſs in the third or fourth operation has tempted the ſurgeon to cut off the limb.

9. The ſponge is often more uſeful than the needle, and often too in caſes of the greateſt danger. Wherever the wounded artery lies deep, and we cannot cut for it, on account of the nearneſs of ſome great artery or important nerve, as for example, about the neck or

about the angle of the jaw; wherever the bleeding artery is ſo nitched in betwixt two bones that we cannot draw it out with the tenaculum, nor reach it with our crooked needles, as for example, in the fore arm, or betwixt the bones of the leg: In ſhort, wherever we cannot ſee the artery, or cannot ſtrike it, (or ſtrike at it ſafely) with the needle; wherever the bleeding is not ſo much from a particular artery as from a general ſurface; or wherever the blood is thought to flow rather from great veins than from arteries, (as in tearing out cancerous glands from the armpit,) in all ſuch caſes we uſe the ſponge, and we uſe it in the following manner.—We keep the ſponge dry and hard compreſſed; cut it into ſmall pieces, ſquare or long, as the inciſion requires; tie ſmall threads to them, by which they may be drawn away in due time; we chooſe out one piece, thruſt it down to the bottom of the wound, ſettle it there with the point of the finger, either expreſsly upon the mouth of the bleeding artery, or if that cannot be diſtinctly ſeen, upon the place at which the artery bleeds; then lay one compreſs above the ſponge, a ſecond compreſs above the firſt, a third above the ſecond; and taking care to keep the compreſſes always ſteady with one finger, we pile one above the other, till the whole riſes ſo, above the level of the wound, that our bandage operates well upon the whole of this, which is called the graduated compreſs.

I adviſe you, on ſuch occaſions, to keep your tourniquet ſcrewed during the whole operation, that you may not be troubled with blood; to ſlacken it ſlowly,

that the dreſſings may not be diſcompoſed by the too ſudden return of blood; and ſtill to let your tourniquet remain looſe about the limb, and ready to be ſcrewed if the artery ſhould bleed again.

OF OBLIQUE WOUNDS WHERE IT IS DIFFICULT TO FIND THE ARTERY.

But theſe rules belong, ſtrictly, to clean and open wounds, while there are often oblique wounds of the ſmaller arteries, which are attended with peculiar difficulty and danger. It is an oblique wound only, that can produce any form of aneuriſm in the fore arm or leg; for in every wound of the wriſt, the artery lies too ſuperficially, and too open to create any real difficulty with a dexterous ſurgeon; but in an oblique wound of the arm, or fore arm for example, the blood does not eſcape freely, the arm is filled with blood, the fleſh is ſoon corrupted, and the bone ſpoils; the diſeaſe, if allowed to go on thus, is a dangerous one, and the operation, though begun even upon the very firſt day, is very difficult, for the artery is never found with eaſe.

In this matter, then, there are two things chiefly to be explained, viz. the difficulty of finding the artery, and the terrible conſequences of the diſeaſe.

This difficulty of finding the artery is greater than it will be eaſy for you to conceive; and I ſhall ſpeak more fully upon this ſubject, that I may be able both

to explain to you the difficulties, and, at the ſame time to convince you of the natural dangers of ſuch a caſe; and eſpecially, that I may impreſs ſtrongly upon your minds the ſtill greater dangers of ignorance, or timidity; of this cruel lenity, (for it is called lenity) and of the folly of making inciſions too ſmall for the occaſion, which, notwithſtanding, are ſuch as to produce all the pain of the greateſt inciſion, yet at once protracting the operation, and making it imperfect. What caſe is more dangerous, or what operation more important than this of a wounded artery? and where is the other great operation, in which our firſt inciſions are done in this timorous way? I ſhould much rather, I am ſure, cut up the axilla, to get at a wounded artery, than cut through the perineum and bladder, to extract a ſtone. The one indeed is the more terrible diſeaſe, but the other, as you will ſee by the following example, is a buſineſs of immediate life or death.

But yet before I enter upon the deſcription of a caſe which I mean to ſtate to you, I feel the neceſſity of explaining what I think is the import of the caſe; and in a few words, the buſineſs is this:— Sometimes, an artery being ſtruck with the point of a knife or ſword, is merely punctured, and not cut acroſs. The obliquity of ſuch a wound, acts like a valve upon the artery, there is but little blood poured out under the ſkin, and no remarkable tumor is formed: Now, the ſurgeon ſatisfied from the ſudden and violent guſh of blood, that an artery is opened, feels himſelf called upon to look for the bleeding veſ-

ſel, and to cut up the arm or thigh; but preſuming too far upon his own knowledge of the arteries, he makes a new inciſion along the courſe of the artery, neglecting the more eaſy and natural way of ſeeking for the wound in the artery, by enlarging the natural wound: And when, for example, the artery is wounded from the outſide, he ventures to ſeek for it by a new inciſion from within. Thus he gets to that ſide of the artery, where no wound is; his attempts to make it bleed, only preſs the ſlit-like wound in the artery, down againſt the fleſh below, ſo that he cannot ſee the wound, nor even believe that there is one; he tries to make it bleed, but he fails; ſtill, he ſees the main trunk of the artery lying in the bottom of the wound, beating ſtrongly under his finger, apparently entire, and ſtill he cannot believe that there is any wound in it; he continues his work, but he can by no contrivance force it to bleed; he can never ſee where the wound in the great trunk is, nor be ſatisfied whether or not the blood flows from ſome ſmaller artery; but ſtill in his abſence it burſts out furiouſly, and bleeds ſo from time to time, till the patient expires. If I can ſhow you one ſuch caſe, it will be at once a leſſon and warning to you; and the warning will be juſt the more impreſſive, in proportion to the high name of the ſurgeon, who may have been guilty of ſuch a miſtake.

A young man of twenty-five years of age, in parrying a blow aimed, with a ſharp pointed knife, at his breaſt, received it in the middle of his arm. The knife, in that poſition of the arm, entered at the outer

edge of the biceps, and touched the Brachial Artery; he ſtaggered forwards a few paces, and then, fainting with the loſs of blood, fell down. Unfortunately there was no one preſent but a young pupil in ſurgery, ſo ignorant that he bled him, and tied up the arm, putting merely a compreſs upon the wound.

Till the eighth day, there was no farther alarm, when a very ſlight cough brought on a violent bleeding, and then fortunately, a ſurgeon was called, who really underſtood the dangerous nature of the caſe, and he, in his turn, called Mr. Duſchamps, upon whom the care of the patient now devolved; he found the arm enormouſly ſwelled, from the armpit to the elbow, and covered with echymoſis down to the wriſt.

"At nine in the morning, ſays Mr. Duſchamps, I began the operation, the patient being ſeated, and every thing prepared. But, behold, when I introduced my probe into the wound, it paſſed ſo far upwards towards the axilla, that I feared the wound was very high, perhaps in the Axillary Artery itſelf; ſo that inſtead of the operation for aneuriſm, I might find myſelf obliged to amputate at the ſhoulder joint. I begged to have another ſurgeon joined in conſultation, and accordingly Mr. Sabbattier met me in the evening at five o'clock. The operation was performed in the following manner."

Mr. Duſchamps made an inciſion, not by enlarging the natural wound, but by a new cut along the inſide of the arm, in the track of the humeral artery, full ſix inches long, extending downwards from the tendon of the pectoral muſcle along the arm; and by this inciſion,

he penetrated into the aneuriſmal bag, and cleaned it thoroughly of coagulated blood. Mr. Duſchamps and his aſſiſtants then ſuſpending the compreſſion under the clavicle, hoped to ſee the wound, or at leaſt to be directed to it by the bleeding; but though they examined and wrought a full quarter of an hour, and although they ſaw and felt the main trunk of the artery beating under their fingers, they could not by any endeavours, make it diſcharge one drop of blood; ſo that one of them ventured to ſay, he thought it could not be the main artery that was wounded; while others agreed that nothing but a wound of the main artery could account for the firſt violent hæmorrhagy.

In this ſtate of uncertainty, it was reſolved to lay an occaſional ligature under the artery, which if neceſſary at any time, might be uſed, while the artery itſelf ſhould be ſubdued, by compreſſion alone with agaric, and dry lint *. Mr. Duſchamps, firſt enlarged a little

* He is confuſed to the laſt degree in his account of the caſe, ſo that one cannot gueſs, whether he did or did not ſtrike this occaſional ligature through the ſkin and fleſh, as the older ſurgeons did; as Mr. O'Halleran was accuſtomed to do on difficult occaſions, or as Mr. White did lately in Captain Mounſey's caſe; but what makes one ſuſpect that he did ſo is this, that he makes the following contraſt of the two parts of his operation: We reſolved, ſays Mr. Duſchamps, to uſe on the *inſide* of the *wound*, a compreſſion extending along the courſe of the artery; but beforehand, to put in an occaſional ligature, "Dans cette incertitude, nous reſolumes d'employer dans l'interieur de la plaie une compreſſion ſur le trajet de l'artere, et prealablement de placer une ligature d'attente." And next, he ſays, "I paſſed this ligature half an inch above the place, which the point of my finger reached to within the wound;" by which it is plain, that he was paſſing this ligature either through the ſkin, or through the wound he

the wound of the knife, and introduced his finger into it, puſhed his finger upwards towards the axilla; and by this diſſection, was enabled to apply his occaſional ligature half an inch higher than the point of his finger.

Secondly, He covered all the courſe of the artery, within the wound, with agaric and charpie, ſecured by an eighteen tailed bandage; but ſo ſlightly bound, that it did not ſuppreſs the pulſe.

At four in the morning the blood burſt out, but it ſtopped again of its own accord; it burſt out twice the next day, and in like manner ſtopped again. On the third day it burſt out yet again; but the hæmorrhage which came on upon the fourth morning was frightful indeed: The bed was ſoaked through and through with blood, which, from the foulneſs of the dreſſings, had contracted a terrible ſmell. At ten in the morning, ſays Mr. Duſchamps, I reached my patient, and undid the bandages. The agaric and charpie were left in the inciſions made with the ſcalpel; the charpie was drawn out of the firſt wound which was made with the knife; there was ſtill no bleeding, and the patient was dreſſed as before.—Again at mid-day the blood burſt out with amazing force, and again it was ſtopped by the attending pupil. Mr. Duſchamps now undid the

had made on the inſide of the arm, and not the wound made with the knife, which he had now dilated no further than to admit his finger, and he introduced his finger for no other purpoſe, than to ſerve as a directory. "Je pris le parti de choiſir ce lieu pour celui de la ligature, que je fis cinq à ſix lignes au deſſus de l'endroit ou repondoit l'extremité de mon doigt."

dreſſings entirely; cleaned the wound; hoping to ſee the wound in the artery, or, at leaſt the jet of blood, but not one drop flowed.—"With a patient ſo exhauſted," ſays Mr. Duſchamps, "I durſt no longer truſt to compreſſion; I now reſolved to draw the occaſional ligature, and the inſtant that it was drawn, the blood was thrown out with force, proving very plainly that this ligature was below the place of the wound. I applied inſtantly a ſecond ligature above the firſt, the blood was immediately ſtopped, and as immediately did the patient loſe every degree of heat and of feeling in the limb." At this laſt operation of Mr. Duſchamps, his patient had loſt about three porringers of blood; half an hour after he fainted; in a few minutes he revived a little, but a thunder ſtorm paſſing over them at that critical moment with ſome loud peals of thunder, affected him ſo much, that on the third hour after the operation he expired.

"Upon opening the body," ſays Duſchamps, "we found the Brachial Artery wounded from the outſide and from behind; the wound was above the giving off of the Profunda Humeri; ſmall, punctured, made with the point of the knife juſt under the border of the great Pectoral Muſcle; the occaſional ligature ſurrounded the artery immediately below the wound, and that ligature which had ſuppreſſed the bleeding was half an inch above."

Theſe are all the circumſtances of the caſe faithfully tranſlated: But the manifold miſtakes, though ſome of them are ſufficiently obvious, are yet upon the whole ſo complicated one with another, and are at the ſame

time, ſo important, that I muſt force myſelf to explain them to you.

Was is not a weakneſs, to ſuppoſe this ſame Arteria Profunda to be abſolutely eſſential in the preſerving of the limb? And yet this is an opinion which Mr. Duſchamps declares in the moſt unequivocal terms. "Certain other means might perhaps have aſſiſted me in ſecuring the artery in this caſe; although after all," ſays Mr. Duſchamps, "the wound of the artery being above the going off of the Profunda, it was in vain to think of ſaving the arm; but ſtill if ſuch means had but ſecured the artery and ſaved the patient's ſtrength entire, we ſhould have had in reſerve the amputation at the ſhoulder as the laſt reſource *."

Was it not as great a weakneſs to think of ſucceeding by compreſſes, without the compreſſion's being ſufficiently firm to obliterate the artery? Mr. Duſchamps applied his compreſs and bandages ſo ſlackly, that they never affected the pulſe; but had he conceived the true notion of obliterating the artery, and bound his compreſſes ſo as to have ſuppreſſed the pulſe, the artery muſt inſtantly have been forced to bleed, and he would thus have diſcovered at his firſt dreſſing what he diſcovered too late, and only when he drew the occaſional ligature, I mean the place of the wound.

Was it not a conceited and forward thing to truſt

* "Ce procédé m'auroit été de la plus grande utilité dans la première obſervation. La bleſſure de l'artére, à la vérité, etoit au deſſus des artères profondes ſupérieurs, et par conſéquent trop haute pour eſpérer de conſerver le bras; mais le malade alors n'étant pas epuiſe, il reſtoit la reſſource de l'amputation dans l'article."

thus to his knowledge of the artery, and try to find it out by a new inciſion, while he might have been conducted exactly to the wounded point by the plain direction of that wound through which the knife had touched the artery? By this wilfulneſs, Mr. Duſchamps looked upon the artery on the wrong ſide; he ſaw it only through his inciſion upon the inſide of the arm, while it had been wounded by a blow which came to it through the upper and outer edge of the Biceps Muſcle, *i. e.* from without. In ſhort, when the man had been wounded from the outſide of the arm, his ſurgeon looked for the wound from within, and the conſequence was moſt natural, *viz.* that he felt the whole trunk of the artery beating ſtrongly under his finger, but could procure no bleeding from it, and could not ſee the wound. It is a curious proof of a thing, which is proved to us alſo by other accidents (as the aneuriſm from bleeding), that an artery wounded with a ſmall and ſlit-like wound, though fairly wounded, yet will preſerve its pulſe, and will not bleed.

But when Mr. Duſchamps found that his inciſion was too ſhort, and that his operation was imperfectly done, or not at all, when he found his patient bleeding thus dangerouſly, why did he not exert himſelf? Why did he allow his patient to endure five ſucceſſive bleedings without even undoing the dreſſings, when he ought abſolutely to have cut open the arm? Surely I may ſay thus much, when he himſelf ſays, that he had almoſt intended to cut it off.

His inciſion was made from the border of the Pectoral Muſcle down along half the arm, and into the

aneuriſmal ſac. Now, his finger had been paſſed into the ſtab which the knife had made, and had not by a great way gone down into the bottom of that wound; his ligature was placed no more than half an inch beyond the point of his finger, but ſtill it was below the opening of the artery, as was proved during life by the repeated bleedings, and after death by diſſection. Why then did he not go forward with his knife? Why, when he knew the wound to be oblique, when he ſuſpected it to be high, when he though it was even in the Axillary Artery, why did he not go forward into the Axilla? Why ſhould he have ſtopped at the border of the Pectoral Muſcle? or what is this Pectoral Muſcle that it ſhould be reſpected more than the other muſcles of the body?

But, in the relation of this caſe, the laſt bold ſtroke, the only ſucceſsful one, is the moſt melancholy thing of all. It explains but too well what ought to have been done at firſt, and how ſucceſsful it would have been, had it only been done in good time: for he cut open the arm, tied the artery fairly, prevented any further loſs of blood.

This idle inciſion on the wrong ſide of the arm, on the ſide oppoſite to the wounded point of the artery; the long ſearching, without being able to ſee the artery, or to force out one drop of blood; the abſurd thought of ſuppreſſing this bleeding by compreſſion, while the pulſe at the wriſt remained entire; and the frequent bleedings and the final iſſue of the caſe; and moſt of all, the ſudden falling down of the arm ſenſeleſs and motionleſs, the moment that he drew his great ligature,

including of courſe the artery, vein, and nerves, are the moſt decided marks of a bad operation, ill concerted and ill performed, and are leſſons ſo important, as to make it a duty to criticiſe in theſe rude terms men even of the higheſt name; and therefore it is that I chooſe thus to do my duty, and to bear the blame.

But even in this matter of delicacy, I mean to do ſomething more, both to ſtrengthen this leſſon, and to exculpate myſelf. I will not leave it for any one to ſay, "This, after all, may be but one miſtake of Mr. Duſchamps, counte.balanced by many bold and well concerted operations." It is not ſo; and I proceed to prove that, if, as I think, he was wrong, he was habitually wrong; that theſe things were not done merely through the hurry and confuſion of ſuch a caſe, but that this way of cutting for the wounded artery at the wrong ſide of the limb, was his cuſtomary and ſettled practice.

A young man, a joiner by trade, 21 years of age, wounded himſelf with a pair of ſciſſars in the thigh, with a wound ſlaunting from without inwards and backwards; the wound was about two thirds down the thigh; the blood flowed with great force, and the young man was carried to the great Hoſpital la Charité, in Paris, where Mr. Duſchamps was firſt ſurgeon*. The next day, ſays Mr. Duſchamps, at 7 in the morning, I examined the thigh, found it ſlightly ſwelled, lifted

* "Au tiers inférieur antérieur de la cuiſſe droite, avec un ciſeau dit bédane, dont le tranchant étoit de dix lignes. Cet inſtrument pénétra de *devaut* en *arrière*, et de *behors* en *dedans*, et ouvrit l'artère femorale."

the dreſſings, and as ſoon as I lifted that piece of charpie which lay immediately upon the wound, the blood jetted out in a full arch, and the place of the ſtab, and the quantity of blood, left no doubt, as to its being a wound of the Femoral Artery, nor any queſtion about the proper operation, which therefore was deferred no longer, than till 11 o'clock."

In preſence of Mr. Chopart, Boyer, and others, I then began the operation by paſſing a probe into the wound, and the direction of the wound, which it was not eaſy to purſue, carried the probe towards the Femoral Artery, and as nearly as I could gueſs, towards that point where the artery paſſes through the triceps muſcle.

" Without minding this wound at all, I made a new one of ſix inches long in the track of the Femoral Artery, ſo directed, as that the wound of the artery itſelf, ſhould moſt probably lie in the middle of this long cut. The integuments being thus opened, I diſſected through that muſcle which immediately covered the artery with all poſſible care; till I diſtinctly felt the artery beating under my finger. As there was no extravaſation of blood, and of courſe no cavity, it was impoſſible to lay the artery quite bare; but yet I cut up to it, as cloſely as common prudence would allow of; the artery wounded from behind, preſented no wound to me on this ſide, and though we ſuſpended the compreſſion at the groin, not one drop of blood flowed, either from my inciſion, or from the wound: Once more, I introduced the probe into the wound of the ſciſſars, and felt the end of the probe not naked

indeed, but near the courſe of my inciſion; with the point of my finger, I cleaned the parts, wrought with ſponges, left the artery of the groin quite free; but ſtill, not one drop of blood iſſued from either wound *.

Thus was Mr. Duſchamps left in great confuſion; certain, by the direction of the wound, and by the bleeding, that the ſciſſars had touched the Femoral Artery; uncertain only where to apply his ligatures, or how:—perplexed moreover with the doubts of his aſſiſtants, who not having ſeen the bleeding, and ſeeing and feeling now the ſtrong beating of the artery, feeling alſo the entireneſs of the pulſe below, could not believe that the wound had touched the artery. They were alſo the more inclined to this opinion, from their not underſtanding what the blunder was which Mr. Duſchamps had committed, (*viz.* cutting on the wrong ſide of the artery), which made it difficult for the artery to bleed, and impoſſible for them to ſee it bleed, whether it was wounded or not.

* " En préſence de MM. Chopart, Boyer et autres, je procédai à l'opération de la maniére ſuivante. J'introduiſis une ſonde dans la plaie; ſa direction, que j'eus de la peine à ſuivre, la conduiſit vers l'artère femorale, à-peu-près à l'endroit ou elle paſſe à travers le tendon du grand adducteur. *Sans avoir égard a cette* plaie, je fis une inciſion de la longueur de ſix à ſept travers de doigts, ſur le trajet de la fémorale, de manière que le lieu ou la bleſſure de l'artère pouvoit etre ſuppoſée, ſe trouva dans le milieu de l'inciſion; les tégumens ouverts, je pénétrai à travers le muſcle qui couvre l'artère avec toutes les précautions néceſſaires juſqu'à ce que ſon battement me fut ſenſible.

Comme il *n'y avoit aucun epanchement ſanguin*, et par conſequent aucune cavité, il me fut impoſſible de mettre l'artere parfaitement à découvert. J'en approchai le plus près poſſible, et autant que la prudence put me le permettre. Celle-ci, bleſſée à ſa partie *poſterieure*, ne me preſentoit aucune *ouverture*."

Something they ſaw muſt be done, Mr. Duſchamps therefore cut and diſſected nearer and nearer to the artery, and came as cloſe to it, as he ſafely could. The probe put into the wound of the ſciſſars, ſeemed to touch the artery at the very point, where it paſſes through the triceps muſcle; he therefore ſtruck one ligature below the artery, half an inch under the paſſage through the triceps. By ſtraitening this lower ligature in a temporary way, the blood was ſtopped in the canal of the artery, and the artery was forced to bleed above; by this mark, the upper ligature was put alſo round the artery, higher than its wounded point, and the loop of this ligature being alſo tightened for a moment, by puſhing the point of the finger under it, inſtantly ſuppreſſed that bleeding, which the tightening of the lower ligature had produced. Every thing being thus ſettled to the contentment of Mr. Duſchamps, the ligatures were drawn cloſe and tied, the bleeding was ſuppreſſed, the wounds were dreſſed lightly, and every thing went on well for ſeven days, the limb had recovered from the loſs of its main artery, and what is always more doubtful, the artery itſelf continued ſecure. But on the ſeventh day, thoſe ſecondary bleedings came on, by which ſo many patients have died, and it was after encountering great difficulties; after many burſtings of the artery, after much loſs of blood, and, of courſe, an irreparable injury to his conſtitution, that this young man was ſaved. In ſhort, they ſaved with great difficulty, a young man of a laborious profeſſion, in the very prime of life; the arteries young, and in that flexible condition,

in which we ſhould have the beſt hopes of procuring a ſpeedy adheſion, of making an uninterrupted cure! —This is a caſe, which preſents this queſtion ſtrongly to us, Why ſhould not the artery have kept ſteady the very firſt tying, if it was poſſible to keep it ſteady in the end?—But as I have paſſed already through all thoſe rules, which direct the manner of ſecuring any great artery, I refrain from mentioning many of the unfortunate accidents of this caſe, keeping plainly to the point in queſtion.

It is ſufficient to ſay, that Mr. Duſchamps had made miſtakes in the very beginning of this caſe, which never after could be put to rights: and all the frequent yieldings of the artery, and the terrible loſs of blood, were owing merely to the artery being irregularly tied.

What buſineſs had Mr. Duſchamps to truſt ſo much to his own knowledge, or to make an inciſion in the courſe of the artery, when he might ſo eaſily have taken the plain direction of the wound? Why ſhould he have looked on the inſide of the Femoral Artery, for the wound which had reached it from without, and which, he might have known, had touched the artery, only on its back part? At the time when he might have ſeen his miſtake, why did he continue cleaning and working on the inſide of the limb, at the inciſion which he himſelf had made, when he might ſo eaſily have enlarged that wound, through which the point of the ſciſſars had touched the artery? Surely, if the wound was not on the fore part of the artery, where he was looking for it, it muſt have

been behind; why then did he continue diſſecting, very dangerouſly and difficultly, upon a ſound part of the artery, when he might have gone to the wound of the ſciſſars, and diſſected the artery at a place, where being already wounded, it would have been leſs unfortunate, even although he ſhould have touched it again? But what temptation, above all, had he to forſake the courſe of the natural wound, ſince he had ſeen, (when with his own hand, he firſt lifted the dreſſings), a high arch of blood thrown directly from that wound? as Mr. Duſchamps durſt not make his diſſection ſo clean, as abſolutely to touch, or to ſurround, or to inſulate the artery; what had he to expect from the deep ſtroke of his aneuriſmal needle, with which he placed the ligature? Nothing ſurely, but that it ſhould ſuppreſs the bleeding only for the time, to burſt out more furiouſly, when the fleſh under the ligature faded, and more dangerouſly, ſince it might burſt out as ſuddenly in the night, as during the day, perhaps after the attendants were exhauſted with watching; or when by uſe and cuſtom, they were grown careleſs and too ſecure.

That the ſlackneſs of the ligature, was plainly owing to the fading of the parts, which were included along with the artery, is proved by the following paſſage: "When, on the evening of the ſeventh day, a violent hæmorrhagy came on, I lifted the dreſſing, and found the ligature ſo relaxed, that it had no longer any purchaſe upon the artery, having in a great meaſure, cut through the muſcular fleſh.

Now, if the dreſſings had been lifted, and the ligature found thus ſlackened twenty-four hours after the operation, I ſhould have thought Mr. Duſchamps not far wrong in ſaying, "for the ligature had cut through the muſcular fleſh;" but when on the 7th day, he finds this ligature ſlackened, and the muſcular fleſh gone, he ſhould have ſaid rather, "the muſcular fleſh under the ligature having gangrened, and being conſumed, I found the ligature quite looſe *."

OF OBLIQUE WOUNDS WHERE THE EXTRAVASATED BLOLD DESTROYS THE TEXTURE OF THE PARTS.

But when an oblique wound touches an artery, where it lies deep under the fleſhy bellies of many ſtrong muſcles, or cloſe betwixt two bones, upon their interoſſeous membrane, as in the arm or leg; the caſe is ſtill more diſtreſſing: A ball, we will ſuppoſe, paſſes along the fore arm, rakes along the two bones, wounds the Radial or Ulnar Artery in the bottom of a deep and narrow wound, and then paſſes out beyond the elbow, making an opening too ſmall to let out the blood; or we will ſuppoſe the oblique ſtab of a knife, ſword, or bayonet, touches an artery, lying thus in the heart of the fore arm, under all the muſcles, and cloſe upon the bone; then the following

† Je levai l'appareil; à l'examen, je trouvai la ligature relachée, et telle qu'elle n'avoit plus aucune action ſur l'artère, les parties muſculaires, compriſes dans la ligature, etant en partie *coupées*."

conſequences enſue. The profuſe bleeding, at firſt, proves that ſome artery is wounded; the direction of the wound ſhould aſcertain which artery it is; the ſtopping of the outward bleeding, cauſes an internal aneuriſm, different from the greater aneuriſms of the arm or thigh, as it lies not under a faſcia, forming a fair circumſcribed aneuriſmal bag, but under the bellies of all the muſcles, which are ſeparated from the bones, by a very irregular and a very dangerous collection of blood; the outward bleeding is ſoon ſtopped by compreſſes, and a bandage; the friends are leſs alarmed, ſeeing nothing but a narrow ſlaunting wound; but when the next morning, they ſee the arm black with the injected blood, and ſwelled to an enormous degree, their fear is like their indifference before, quite ignorant, and beyond the true meaſure; they believe this to be an abſolute gangrene, and that the patient is loſt; while the ſurgeon ſees in this blackneſs, not the ſigns of gangrene, but the marks of a wounded artery, and foreſees a difficult and tedious operation of ſeeking it out. But if again the ſurgeon have not the ſkill to foreſee all the dangers of the caſe, the apparent gangrene is ſoon changed into a real one; the limb becomes cold, benumbed, and has a livid redneſs upon its ſurface; the ſkin without runs into a low inflammation; the blood within increaſing every day, corrupts and burſts out; and thus, as I have hinted before, it is not merely by the the wound of its great artery, and by loſing the great trunk that nouriſhed it, that a limb is loſt; but in a caſe like this, it is loſt by the deep

driving of the blood among the flesh and bones. Either the outward bleeding is allowed, and the patient is in danger of immediate death, or the blood is confined, and the bleeding goes on within; so that every time the artery bursts out, the limb is injected anew, as it were, by the arteries, and is in imminent danger of gangrene at every new effusion of blood. The matter is bloody, fetid, corrupt; it prevents the reunion of the bones, (if any bones be broken), it makes foul suppurations, and extensive and fetid sores; and each new suppuration is succeeded by a dissolution of those clots which had for a time stopped up the artery, so that again the blood bursts out; till at length, after many months of suffering, the patient is forced to part with that limb which he has undergone so many dangers to preserve. The extensive sinuses, and foul sores, the disorder of the joints, and the total caries of the bones, makes every such case incurable; so that there is, even from the very first moment, no other alternative for the surgeon, than either to perform immediately a bold decisive operation, or to resolve at once (not keeping the patient in this lingering and cruel condition) to cut off the limb; and to the patient himself the questions may be honestly proposed in these terms: "Will you have this tedious, but necessary operation, of tying the artery, regularly performed? Or will you, to shun a present pain, linger for months in this miserable condition, consenting at last even to lose the limb, when it is perhaps too late to save your constitution, or even your life!"

This is the full deſcription of that caſe, which I hinted at in the beginning of this diſcourſe, when I ſaid, that ſometimes the arteries are wounded deep among the muſcles, and there the blood corrupting the muſcular fleſh, and even ſpoiling the bones, is the occaſion, after long ſuffering, of the patient's loſing often his limb, and ſometimes his life: As the beſt examples of theſe dangers, I ſhall extract for your uſe, the following inſtructive caſe from Mr Allanſon's Book upon Amputation*.

* As one proof of the neceſſity of cutting boldly, obſerve what Gooch ſays, p. 341. "Among the reſt of our converſation at this time, there was mentioned a caſe, in which one of the arteries betwixt the tibia and fibula was opened about the middle of the leg, and the bleeding was ſtopped from time to time by various methods, but at laſt it was thought adviſable to amputate the limb." Mr. Gooch propoſes rather to cut out two or three inches of the fibula, and ſo expoſe the artery; and I would add, that I ſhould rather do any kind of operation, however cruel and tedious, than cut off the leg.

The imprudence of confining the blood, or of delaying the operation is well explained by the notes which our old Surgeon Wiſeman gives us, of a caſe in which he was trying to cure a popliteal aneuriſm by aſtringents and by compreſſion. He informs us, p. 122. "That while he endeavoured to keep the blood within the abſceſs, it inſinuated itſelf between the muſcles, making the calf of the leg hollow to the very tendon." This, we find, obliged him to make long inciſions through the brawn of the leg, before he could accompliſh the cure. In ſhort, whether the artery requires to be tied, or whether the bleeding ſtop, we ſhould neither confine the blood nor procraſtinate our operation; nor make our inciſion too ſmall; for the driving of the blood in this leſſer, as in the greater aneuriſms, diſorders the ſoft parts, ſpoils the bones, puts the artery further and further out of our reach; and makes the abſceſs extenſive, the operation difficult, and the cure tedious; ſmall inciſions alſo prevent the artery from being well ſeen and cleanly tied.

Harry Knowland, a ſeaman, was wounded, in an engagement at ſea, with a ball, which entered under the patella, broke the tibia and fibula, obliquely near their upper end, paſſed obliquely through the leg backwards, and a little downwards, and came out at the middle of the calf of the leg, followed by a great bleeding from the wounded arteries, and many ſplinters of bone.

A well inſtructed ſurgeon would have made a large and bold inciſion, laid open the wounded veſſels, that he might tie them; would have picked away all the looſer ſplinters of bone, but he would have been careful, above all, in tying the arteries, knowing that if they continued to bleed outwardly, the patient might die; if inwardly, that they muſt inject the leg ſo ſtrongly with blood, that it might fall into gangrene, and would, at all events, run into a foul and gangrenous ſuppuration. That the bones alſo, far from reuniting, would in a few weeks, be throughly and irrecoverably diſeaſed.

A fortnight after this wound, nothing having been done, meanwhile, to ſave his limb, this man was carried on ſhore and put into the Liverpool Infirmary, where he lay four entire months. At firſt his knee and the whole leg were greatly ſwelled; the leg and foot cold and œdematous, with a very languid circulalation through the whole limb: He had moreover a fever upon him, with a great depreſſion and languor, a foul tongue, and a ſmall quick pulſe.

When the bullet holes were firſt dilated, there iſſued a great quantity of ſanies highly fetid, mixed with clots

and putrid blood. Bark and wine were uſed during this putrid or gangrenous ſtate; and free dilatations were made when the time arrived, for giving vent to the foul ſuppurations.

In the courſe of this tedious caſe, the callus often began to form, and they had hopes of accompliſhing a cure; but the deep ſeated hæmorrhagy continually returned upon him, coagulated blood was accumulated anew in every part of the limb, with a new diſcharge of putrid ſanies, new ſinuſes, new ſuppurations; and thus, from time to time, the incipient callus was deſtroyed.

Four months they ſtruggled againſt theſe diſappointments and difficulties, ſupporting him all along with diet and wine, often dilating the openings for the putrid ſanies, ſometimes extracting the ſplinters of bone, till at laſt ſuch a bleeding came on, as put an end at once to all hopes of a cure. The whole limb was relaxed and ſwelled; the cellular ſubſtance gorged with coagulated or putrid blood; the hæmorrhage came deep from among the callus, from the very centre of the limb; the man was quite emaciated; his ſtomach was ſo enfeebled, that he could receive no ſolid food; his health was already broken, and it was plainly imprudent to ſtruggle longer, and impoſſible to ſave the limb. The limb was cut off*.

* Upon injecting the amputated limb, the wound was found to be in the poſterier tibial artery. It had been cut entirely acroſs by the ball; the upper end indeed had, by ſome accident, cloſed up; and at the final hæmorrhagy, perhaps alſo at many of the former hæmorrhagies, the blood had come from the lower end of the wounded artery, it having returned freely by the inoſculations of the foot and leg.

The plain rule reſulting from this caſe needs hardly be explained ; it is ſcarcely more than a recapitulation of that rule which has been already delivered : but it puts it in a ſtronger point of view, *viz.* that we ſhould cut boldly ; ſeek freely for the artery ; tie it ſecurely with the needle : and it is only where the artery can by no means be taken up with the needle, that you are at all to truſt to the ſponge, and even then, not willingly, nor without every precaution of firm compreſſes, tight bandage, a tourniquet to ſecure the patient from any deadly hæmorrhagy, and the appointing of attendants well accuſtomed to ſuch a charge.

DISCOURSE V.

ON GUN-SHOT WOUNDS.

THERE ſeems to be a ſort of myſtery in the buſineſs of gun-ſhot wounds, which ariſes merely from the ſingular ideas which the older phyſicians entertained concerning the nature of ſhot. For gun-ſhot wounds are made by a blunt round body, which inflicts a deep and dangerous wound, and ſo bruiſes the ſurrounding fleſh, that the wound is at firſt livid, ſoon becomes black, has little bleeding and no pain, ſoon falls into actual gangrene, and is extremely difficult to heal.

Here then are ſome ſtrange peculiarities; and it is excuſable, or at leaſt, it is not wonderful, that the older phyſicians, ignorant of the laws of the animal economy, and of the properties of the living body, ſhould have agreed that there was ſomething very particular in gun-ſhot wounds, which ſome, on account of the blackneſs, aſcribed to the heat of the ball, and theſe ſuppoſed every gun-ſhot wound to be a burnt wound; while others believed, that the powder was of a dangerous nature, and that a ball made of neceſſity a poiſoned wound: There were others again, who being

actually engaged in war, and as yet but little acquainted with fire arms, believed that their enemies were ſo barbarous as to poiſon their balls. Parée tells us, that while the King of France was beſieging Turin, the beſiegers and the beſieged mutually believed that their enemies had poiſoned their balls, ſo cruel and untractable were the wounds; but after the taking of the city the ſoldiers of both parties met, and then they ſaw that their own clean and unpoiſoned balls had made the ſame cruel wounds. But beſides, it often happens, that when a man is ſhot, he is overtaken with an awful trembling and diſorder of the nervous ſyſtem, the braveſt cannot reſiſt it, and the moſt acute phyſiologiſt cannot tell whether it is a diſorder of the body or a tumult of the mind. This too is peculiar, and ſerved to confirm the common opinion, *viz.* that theſe were poiſoned wounds. What indeed could more reſemble the bite of a ſerpent or ſome poiſoned wound, than an inſtant affection of all the body, a trembling and unaccountable ſinking within, yellowneſs of the face, paleneſs of the extremities, a failing of the pulſe, and a livid wound from which no blood was diſcharged.

I ſhall comment upon the true cauſe of theſe ſymptoms in the concluſion of this diſcourſe; but, in the meanwhile, it is natural to obſerve, that almoſt every doctrine has drawn after it ſome peculiar practice, good or bad, dangerous or uſeful; and this pernicious doctrine of there being ſome kind of poiſon in a gun-ſhot wound, has been the root of all the harſh practices and cruel operations of the older ſurgeons: for, in order to ſubdue this poiſon, they made deep inciſions, applied

the actual cautery, burnt the wounds with turpentines or hot oils; and the phyſicians who took the direction in thoſe days, would not in any circumſtances allow the ſurgeons to bleed, leſt the poiſon ſhould thus be drawn back into the veins.

"Our daily experience, ſays Barbetti, proves to us but too well, how poſſible it is to poiſon balls, and we can diſtinguiſh ſuch poiſoned wounds, by the vehement pain, livor, ſudden blackneſs, and ſymptoms terrible quite beyond the nature of a common wound; as burning heat, trembling, fainting; while even the ſmalleſt poiſoned wound, eſpecially if neglected, or near the vital parts, brings preſent death. Bleeding or purging are dangerous, (for theſe draw the humours inwards); the poiſon may be extracted, by ſcarifications, by cupping-glaſſes, by drawing medicines, or beſt of all, by the actual cautery: But to expel the poiſon, our chief internals are ſudorifics and cordials *."

This which is, I believe, a fair and honeſt ſample of the notions of the older ſurgeons, concerning poiſoned

* Quotidiana experientia globulos venenatos effici poſſe docet. Vulnera venenata GLOBIS, ſagittis, gladiis aliiſque inſtrumentis, plus nocent vi venenata quam vulnere; ſigna ſunt dolor vehemens, color lividus mox niger, ſymptomata gravia præter rationem vulneris: In toto corpore ardor, tumor, delirium, lypothymia, &c. Vulnus etiam exiguum venenatum mortem afferre poteſt; imprimis ſi loco cordi, aut parti alii nobiliori proximo extiterit; curatio in hoc præcipue conſtitit ut VENENUM EXTRAHATUR, cucurbitulis, medicamentis extrahentibus, ſcarificatione aut, quod tutiſſimum, actuali cautereo, &c. Interne medicamenta proſunt *ſodorifica atque cardiaca* nocent venæſectio et purgatio.——PAULI BARBETTI, Chirurgia, Liber de Vuln. Venenat.

and gun-ſhot wounds, is ſuch miſerable ſtuff, as I ſhould think it needleſs to mention to you; were it not, that hints like theſe, concerning the hiſtory of ſuch matters, enlarge the mind, and ſet it free from prejudice, more than the moſt ſerious and laboured arguments could do, more than even experience itſelf. It is alſo ſuch folly, as can be believed only by thoſe who are acquainted with the abſurd notions of the older phyſicians, concerning common wounds. The myſteries which they utter on thoſe high occaſions, involved in ſtrange terms, are very amuſing. The ſame Barbetti tells us, very gravely, "that wounds of the lungs, require comforting and drying medicines." "That ſpermaceti, though it heals the lungs, damages the brain*." "That in a wound of the eye, the blood of cocks and pigeons, is very good; but that the patient had better have nothing to do with eating bacon †."

Parée, a ſurgeon whom I have often taken pleaſure in ſpeaking of, was a man of extenſive knowledge, and ſterling good ſenſe, and had the abilities and the courage to be a thorough reformer: and we find him continually warring againſt the miſtakes and prejudices of the older ſurgeons. "I had heard of nothing, ſays he, ſo often as of the poiſoned nature of gun-ſhot wounds, and had read both in De Vigo, and in Guy De Chauliac, of the ways of burning them with boiling oils. When the French armies made their way into Pied-

* Spermaceti drachmæ dimidiæ pondere quotidie adſumptum in vulneribus pulmonum inſigniter operatur, at cerebrum debilitat. P. 206.

† Sanguis turturi columbæ, galinæ, &c. conveniunt in vulnere oculorum, ſed ab omni pingue abſtinendum. P. 204.

mont, many of our ſoldiers, ſays Parée, were wounded in the ſmaller garriſons: And I ſaw the army ſurgeons uſing their terrible cauteries, and I alſo followed the common practice, and dreſſed the wounded with boiling oils, until all my oils were expended. On the night on which this happened, I dreſſed my wounded ſoldiers with oil of roſes, and turpentine, with whites of eggs. I went to bed much oppreſſed, with the apprehenſion that all theſe poor fellows would be found in the morning poiſoned and dead. I aroſe therefore betimes, and learnt, to my infinite ſurpriſe and pleaſure, that they had ſlept well and eaſy; without any pain, or ſwelling, or redneſs about the wounds; while thoſe of my ſoldiers who had been cauterized with the hot oils, had great fever, and ſwelling, and excruciating pain." This fortunate accident determined Parée in favour of the milder dreſſings, and was moſt probably the cauſe of all his future ſucceſs. "I have, ſays Parée, been in my time chief ſurgeon to ſix warlike Kings of France, often in battles, and often ſhut up in beſieged towns: for 30 years I have never uſed thoſe burning oils, and I have never loſt one patient, whoſe death could not be fairly accounted for by his bad habit, or by a contagious air!"

There is another curious anecdote, connected with this reformation of Parée's practice, which both ſhows the ignorance of the age he lived in and demonſtrates in a particular manner, that thoſe among the cauterizing ſurgeons, who uſed milder dreſſings, were ſure of acquiring a high name.

After the taking of Turin, Parée inſinuated himſelf into the good graces of a man, who had a high character for curing gun-ſhot wounds; and having attended this ſurgeon, for two years, Parée when about to leave Turin, prevailed upon him to diſcloſe this great ſecret. He made Parée gather a pound of earthworms, and procure two living dogs, he infuſed the earthworms in white wine, and put the live dogs into boiling oils, till the fleſh ſeparated from the bones, then mixing them, he made a mild ointment, and this, he took a ſacred oath, was the balſam with which he performed ſuch wonderful cures. The "oil of whelps," (for Oleum Catellorum is the name he gives it; by which it was long known and much uſed by all the ſurgeons in Europe),—would make a ſtrange figure in a Diſpenſary liſt; but we find Parée often preſcribing the earthworms, and boiled whelps, as an excellent mild application for ſoftening and bringing off the eſchars, and for eaſing the wounds. No doubt this preſcription, though ludicrous in ſome reſpects, was infinitely preferable to boiling oil. Parée uſed it with great ſucceſs, and the inventor of this fooliſh but mild ointment had got an eſtabliſhed reputation by it; Parée recommended theſe mild dreſſings ſo effectually, that the chief ſurgeons of his time followed his example, and thus ended the practice of hot turpentines or boiling oils.

There are other prejudices of the preſent day, concerning the effects of a cannon ball, not leſs abſurd, than thoſe older notions concerning the nature of gun-ſhot wounds: It is, for example, believed, that even

the whiff and wind of a ball, will extinguiſh life. I have heard ſenſible men of our profeſſion affirm it. We find Belguer, the famous Pruſſian Surgeon, perfectly convinced of it; and Tiſſot, in tranſlating a book upon gun-ſhot wounds, ſets himſelf gravely to prove by many laboured calculations, how intenſe the force muſt be of that air, which is preſſed forwards by a cannon ball. This way of talking ſuits very well an ignorant midſhipman, or the coarſe boatſwain of a man of war; and many a good tale, no doubt, goes round in the cock-pit about this wind of a ball; but it is unpleaſant to obſerve men like Belguer talking ſo idly about this matter. Surely Belguer, of all people, might have known, that a man's right leg is often ſhot away, the breeches of the left thigh torn, and yet the thigh itſelf ſafe; and ſurely he muſt have ſeen the arm torn from a man's body, while his body has yet remained unhurt; how could a ball paſs cloſer to the body, than in tearing off the arm? and when can this wind of a ball be dangerous, if ſuch a man eſcape? Surely, Mr. Belguer muſt alſo have ſeen an officer's leg carried away by a ſhot, which had not hurt his horſe, or a ball carrying off a man's arm, while his fellow, who ſtood cloſe up to him in the ranks, received no hurt.

Nay, ſtill further, caſes ſtand upon record, from the very beſt authority, of ſoldiers whoſe arms had been carried away by the ſhoulder joint; yet they ſuffered nothing but the loſs of their arms, from which alſo, they have recovered well.

But yet there is no report of this kind, however ſtrange, which has not ſome meaning; and the reaſon

of all theſe wonderful tales, about the wind of a ball, is itſelf very wonderful; men often fall in the field of battle, and when the camp followers come to turn over their bodies, in burying their dead, no wound nor mark of injury is ſeen; and often alſo, men are laid in the military hoſpitals, dying and unable to ſpeak, upon whom there is found no kind of wound, nor even the ſlighteſt bruiſe of the ſkin.

Now this apparent difficulty will diſappear entirely, when I inform you, that often a limb is broken, while the ſkin remains unhurt, and a dreadful fracture it is: for when a great bullet ſtrikes fairly, it knocks off the limb; but when it ſtrikes obliquely, it buffs along the ſkin, the ball is turned away, and the part ſtruck, becomes inſenſible in the inſtant; there is no feeling of the terrible accident that has happened, the patient is ſenſible of nothing more than a confuſed ſhock; hardly knows where he is ſtruck, and falls down. This fracture is of the worſt kind; for it is accompanied with ſuch a bruiſing of the parts, that they never can be reſtored; and though the ſkin is ſtill entire, there is much blood extravaſated, the muſcles are in an inſtant reduced to a gelatinous and pulpy maſs, the bones are broken, and the fleſh, and the perioſteum are to a great extent torn from the bone; they are often ſo torn, that the limb cannot be preſerved.

Let a ball hit any of the great cavities thus obliquely, and this phenomenon appears; the patient is killed without any external wound. He is killed, according to the notion of his fellow ſoldiers, by the wind of ſome great ball: But we know that the ball has actually

ſtruck him, that the breaſt, the belly, or the head, have been hurt. If the cheſt has been ſtruck, then the ribs have perhaps yielded, and eſcaped the blow; but the lungs have ſuffered, and often there is blood extravaſated in the cheſt, which ſuffocates the lungs: in the belly there is often a burſting of the liver or ſpleen, without any outward wound of the ſkin; very frequently in the head, though there appears no outward injury, the pericranium is ſeparted from the ſcull, or there is an effuſion of blood upon the brain. Nor is this piece of knowledge entirely without its uſe; for extravaſations of this kind, have been ſometimes diſcovered by the pulſe, and breathing, and have been relieved by making inciſion into the belly or cheſt.

Gun-ſhot wounds, then, are not poiſened wounds; for no ball is poiſoned on purpoſe, and as for powder, it is ſo far from being hurtful, that it is often uſed by ſoldiers to waſh their wounds with, or ſprinkle upon their ſores; and often, as Magatus obſerves, when they are infected with venereal ſores, they burn them with gunpowder; nor are gun-ſhot wounds burnt by the heat of the ball; for if you fire your piece againſt a ſoft body, upon picking up the flattened ball you will not find it heated. Nor is there any ſuch thing as an injury, much leſs death, ariſing from the wind of a ball; but when a great ball hits a limb obliquely, it breaks the bones, without injuring the ſkin; and of courſe, when a ball buffs along the ſurface of any great cavity, though the ſkin is left entire, the bowels within are hurt, the lungs or liver are

burſt, and the cavities of the abdomen or thorax being filled with blood the perſon dies.

Without, therefore, any ſuch childiſh repreſentation, there is enough truly wonderful and dangerous in the nature of gun-ſhot wounds, to occupy our attention; and theſe real accidents, I ſhall now try to explain to you.

1. There is that trembling, fainting, and unaccountable fear, which comes over every man, the brave, and the daſtardly, the ſtrong, and the weak; like the flutterings of a wounded bird, unaccompanied with any diſtinct ſenſe of danger, and without the leaſt degree of pain.

M. Le Dran in ſpeaking of this ſymptom, does not cover it with the delicacy, or rather cunning, of Ravaton or La Motte; he does not argue with them, that "this confuſion cannot be the effect of fear, in a nation noble minded and courageous to exceſs, and who often lying mortally wounded upon the field of battle, are heard encouraging their companions to fight bravely for their king and country." Le Dran deals more honeſtly. He had perhaps as high an eſteem for the courage of his own countrymen; but he knew that there was no need for boaſting of that national courage which had been ſo often ſhown. Le Dran declares the plain fact, without any colouring or reſerve: "From a principle," ſays he, "which nature has eſtabliſhed in the human mind, it is, that as ſoon as one feels himſelf wounded by fire arms, he is ſtruck with a panic and oppreſſion too violent to be concealed. In that firſt moment of alarm, his reaſon

gazes on nothing but danger, and there often follows a deprivation of almoſt every ſenſe." And ſo regular is this ſymptom of trembling, fainting, and nervous affections, upon receiving a great wound, that the old phyſicians, who would account for every thing they ſaw, and who too often would ſee nothing, unleſs they could account for it, aſcribed the trembling and diſorder to that motion or trembling of the part, which was excited by the rapid motion of the ball *.

Thus the firſt ſymptom which follows a dangerous wound, is a trembling ſo ſudden, ſo violent, ſo unaccountable to the wounded perſon, that it is at once a conſequence and a cauſe of fear. There is a fluttering, oppreſſion and fainting; there is univerſal coldneſs and a trembling of the pulſe; there is a yellowneſs or a livid colour of the face; and often, there is not confuſion merely, but abſolute inſenſibility, which continues during the ſcarification of the wound, or during the amputation of a limb; and in one caſe the patient continued ſtiff and quite inſenſible to all that was done to him, till death †.

2. A gun-ſhot wound being formed by a round and bruiſing inſtrument, muſt have the appearance of

* Mr. Belguer accounts for it by this concuſſion. Vide his marginal note, P. 57, and his text in P. 56. Atque ea quidem univerſi corporis commotio ab aere externo qui a tormenti grandioris globe perniciſſime propulſo provolutoque comprimitur, condenſatur, celerimeque agitatur.

† Vide Mr. Queſnoy's Eſſay on Gangrene.

one formed by a club, or any ſuch blunt weapon, *i. e.* there will be a laceration rather than a clean cut, and there will be extravaſated blood where the ball has ſtruck, much disfiguring the lips of the wound; and thus the following appearances and changes ſucceed each other in the following order: The wound is black round the edges; this livid part falls into gangrene; the gangrenous parts fall off in a few days; and when theſe ſloughs give way, a profuſe bleeding very often comes on. Theſe are the true peculiarities of the gun-ſhot wound. The extravaſated blood makes it black or livid; the bruiſe of all the ſurrounding fleſh occaſions a ſuperficial gangrene; the gangrene too often goes deeper than the ſurface, for all the ſurrounding parts are ſo much hurt by the ſhot that they gangrene almoſt as ſoon as they inflame; and the inflammation alſo of gun-ſhot wounds muſt often run very high, ſince there is a violent wound, that wound goes deep among the fleſh, the opening is narrow, and there is often a foreign body, a ball, or pieces of cloth, lodged at the bottom of the wound.

3. Since a gun-ſhot wound is truly a bruiſe, begins with inſenſibility and ends with gangrene, the ſuperficial gangrene or ſloughing of the ſores is the chief characteriſtic of gun-ſhot wounds, and each of theſe accidents deſerves notice, not merely on account of the peculiarity itſelf, but of the rule of practice which it draws along with it.

As for the trembling, coldneſs, and change of countenance, though it would lead one to apprehend that ſome of the viſcera or ſome great artery were wound-

ed, it is no ſign of danger, but goes off in a few hours, and, as after the cold fit of an ague, an intenſe fever ſucceeds. If any thing be required, it is only an opiate or a cordial.

The narrowneſs of the orifice, and the ecchymoſis or bruiſed appearance of the wound, are the great peculiarities of a gun-ſhot wound. "No gun-ſhot wound heals by adheſion;" every gun-ſhot wound ſuppurates, or in other terms, inflames. To make that inflammation eaſy, and to relieve the ſtricture of the narrow opening, we ſcarify or open up with the ſcalpel both the mouths of a gun-ſhot wound.

The ſloughing is cauſed by the bruiſe; the bruiſe deadens the parts, ſo that they feel no pain; while they feel no pain, they pour out no blood; but on the eighth, tenth, or fifteenth day, the wound is inflamed; the active veſſels now throw off the dead parts; this diſcharge of the ſlough throws all the veſſels open, and thus the veſſels which had not bled, burſt out upon the eighth or tenth day: And there, of courſe, follows a caution of the utmoſt importance, that it is the nature of a gun-ſhot wound, to bleed little, at the time the wound is inflicted, but to burſt out ſuddenly, and to bleed furiouſly, at the falling off of the eſchar, that is on the eighth, tenth, or fifteenth, days; at that time, it muſt be watched with the utmoſt care, for the blood often burſts out during the night, and in the morning the patient is found dead, bathed in his blood.

Thus the myſtery of gun-ſhot wounds vaniſhes, when we conſtrue all their appearances into the com-

mon operations of the economy; it is not becauſe they are poiſoned or burnt, that they are thus malignant; but it is becauſe they are bruiſed, that they gangrene; it is becauſe they do not at firſt bleed, that their after bleeding is ſo dangerous; it is becauſe they are deep, penetrating, and ecchymoſed, *i. e.* bruiſed, that they appear malignant, and do not eaſily heal.

DISCOURSE VI.

ON GUN-SHOT WOUNDS.

IN my laſt diſcourſe, I explained to you the peculiar nature of gun-ſhot wounds. "I obſerved that it is not becauſe they are poiſoned or burnt, that they ſhow their malignant nature; but is becauſe they are bruiſed, that they gangrene; it is becauſe they do not bleed at firſt, that their after bleeding is ſo dangerous; it is becauſe they are deep, penetrating, and bruiſed, that they appear malignant, and do not eaſily heal." In theſe ſhort definitions, are pretty accurately marked the chief peculiarities of gun-ſhot wounds; and their peculiar nature draws after it a peculiar practice; for it is to open this narrow wound, to unload the pent up veſſels, and to quicken the falling off of the bruiſed parts, that we ſometimes ſcarify thoſe wounds; this ſcarifying converts ſuch a wound in ſome degree, from its peculiar nature as a gun-ſhot wound, to that of a freſh, open, and bleeding wound. Thus the motives for this practice, are laid down in a general way; and taking this for my text, I ſhall proceed to branch out

this practice of ſcarifying, and probing, into all its operations.

1ſt, I ſhall explain to you, how you are to examine a gun-ſhot wound; how to gueſs at its direction, to prognoſticate its event, to declare whether any of the viſcera, or any great veſſel or nerve, be wounded.

2dly, I ſhall teach you how to ſcarify a gun-ſhot wound, ſo as to open its veſſels, looſen the bruiſed parts, and leave a free opening, as a drain for the matter, or for the extraction of the ball.

3dly, I ſhall juſt put you in mind of avoiding the arteries, or tying them when cut; and,

4thy, I ſhall give rules for the extraction of balls, cloth, ſplinters of bone, or of any foreign bodies, which might prevent the healing of the wound.

I know very well that theſe heads of diſcourſe will ſeem very ſhort, and that you will think they might be eaſily delivered, almoſt in the direct and plain form of practical rules. But in truth, the details which fall under theſe four heads, contain the whole of practice; and in order to inſtruct you thoroughly, I muſt firſt teach you by leſſer directions, many of which muſt go to make up a great rule. But rules of practice are ſo ſatisfactory to the young ſurgeon, ſo eaſy to be remembered, and keep the judgment ſo clear, that in a matter like this, I ſhall be careful, firſt, to inſtruct you in all theſe minutiæ of practice, and then to collect theſe particular directions, into general and formal rules.

I. OF EXAMINING GUN-SHOT WOUNDS.

No ſooner does the ſurgeon ſee his wounded ſoldiers carried into his tent, than the very ſight of a man, pale, and perhaps bleeding, awakens the ſtrongeſt intereſt, and a lively anxiety, to know the nature of his wound; but how much ſtronger muſt the patient's own feelings be, who waits in awful ſuſpenſe, while he learns even from the countenance of his ſurgeon, the ſentence of life or death!

A ſurgeon of experience no ſooner caſts his eyes upon his patient, or feels his pulſe, or puts his finger into the wound, than he has ſome preſentiment of the event. But ſuppreſſing all haſty concluſions, which are ſo often corrected by reflection, he begins to examine his condition more deliberately. He obſerves, firſt of all, the trembling, fainting, ſtupor, and paleneſs; but this agitation of the ſyſtem, he knows to be natural, and that it is no cauſe for apprehenſion; he knows, that it will go off by compoſure, cordials, and reſt. Then, if the wound be near the belly or breaſt, he obſerves the breathing, and feels the pulſe, for it is by theſe, that he gueſſes whether it be a dangerous wound. If with a wound of the breaſt there be great oppreſſion of breathing, and the pulſe fluttering, interrupted, or very weak, but more eſpecially, if there be a blaſt of air from the lungs, there muſt be danger. If from a wound of the belly, there be lowneſs and inſenſibility, frequent fainting, a weak pulſe, and the extremities cold, then ſome great vein or artery is wounded; there is a bleeding within; the belly ſwells, the

breathing is oppreſſed, the faintings increaſe, and how long ſoever life may be ſuſpended with ſuch a wound, the patient muſt die.

There is nothing in which good ſenſe, and a correct judgment, and above all a humane temper, may be more particularly diſplayed, than in this of probing wounds: To a man of ſkill, and real knowledge in anatomy, the direction of the ball, will of itſelf declare the danger; the ſymptoms will confirm that terrible ſentence, which he has ſecretly conceived; and ſeeing what is likely to happen, his good ſenſe and feeling, will reſtrain him from making inquiries, which muſt give the patient alarm and pain, and which cannot relieve nor ſave him. How oppoſite to this modeſt conduct, is the temper of thoſe, who, with a flippant vanity, will introduce their probes among the viſcera of the breaſt or abdomen, where they never ſhould be; from the contemptible deſire of exalting their own little character, by pronouncing their opinion over a dying man? Turning their dying patients, ſays Ravaton, with what I would call a cruel ingenuity, into the particular poſture, in which they happened to receive their wounds, declaring with great pomp, that the wound is in the ſtomach, the liver, or the lungs; while it is plain, that ſuch opinion has no influence on our practice, nor any relation to the patient's ſafety. Surely no ſuch idle thoughts ſhould be indulged; perhaps a ſurgeon might be hurried into this folly, by the anxiety of friends, inquiring with eager haſte, whether the patient were ſafe, and ſeeming to make the prognoſtic their teſt of the ſurgeon's ſkill. But a

ſurgeon ſeeing his patient's danger, and knowing that it would cauſe more danger, and put him to needleſs pain, were he to ſearch his wounds; ſhould be ready to ſet a guard upon his own actions, and forego a little momentary reputation, for his patient's ſafety: and yet after all, it is perhaps no ſacrifice; for faithful and good conduct, which brings the trueſt reputation, is diſtinguiſhed even by the ignorant in the end.

Our ſurgeon Ranby, agrees with La Faye and Ravaton, in refraining from uſing the probe, in wounds of the belly or breaſt; "for thruſting the probe down into theſe cavities, is at every repetition of ſuch practice, a freſh ſtab *." This practice ſeems to have gone as much againſt his feelings, as againſt his judgment; for he ſays, "I never could bear the thoughts of thruſting a long pair of forceps, the Lord knows where, without any probability of ſucceſs †."

But to paſs over authorities, the plain reaſon for not probing too curiouſly in wounds of the liver, lungs, bowels, or other internal parts, is, that our conduct is nothing affected by it; after ſuch a wound, we lay the patient quietly in bed, there to take his fate; we wait for ſymptoms, and judge by them of his condition: It is only by the courſe of the ſymptoms, that we are regulated in our practice, and not by an apparent danger in the wound; we find it is better for our patient, it is even ſafer for our own reputation, (if thoughts concerning it, are to be allowed), to refrain from theſe uſeleſs ſearchings; for wounds are often

* Page 6. † Page 8.

really dangerous when we believe them ſafe, and ſtill more frequently, it happens, that we believe them dangerous when they heal without one bad ſign.

This leſſon cannot be better enforced, than as it was delivered by La Motte, to a ſurgeon, who ſhowed himſelf too well prepared to do ſomething, before he could tell what needed to be done. It was in the caſe of a young gentleman, who had been wounded with a rapier, quite acroſs the belly, from ſide to ſide; his ſurgeon had provided abundance of probes, ſciſſars, needles, and knives, of all kinds; but La Motte, taking the privilege of an old maſter in ſurgery, told him calmly, that there was no need for all that frightful armoury; the courſe of this weapon, ſays he, is but too plain, and if the bowels be really wounded, I fear we ſhall know it but too ſoon. Accordingly, La Motte was reſolute in doing nothing; he laid a piece of lint upon each wound, bled the young man freely, and in eight days, he was walking in the ſtreets. Here was diſplayed the ſuperior diſcretion and good ſenſe of an old and ſkilful ſurgeon; and, I think I uſe the right word, when I ſay, that La Motte, was reſolute in doing nothing; for had this wound been committed to the ſurgeon, with all his probes, you may gueſs ſhrewdly, that at leaſt, he would not, at the end of eight days, have been in the ſtreets. Your buſineſs then is to obſerve the direction of the ball, to reflect upon its courſe among the viſcera, to calculate for your own private ſatisfaction, which of the viſcera may be wounded; but never be ſo raſh, as to pronounce an opinion on this

uncertain point, either to the wounded man, or to his friends. You obſerve your patient's condition moſt anxiouſly, his breathing, his pulſe, the ſeat of his pain; perhaps alſo you puſh your finger ſlowly and gently into the wound; to examine more into a wound of this nature, and eſpecially, to thruſt your probes down into it, were neither humane, nor ſenſible, and ſurely were no mark of ſuperior ſkill in the ſurgeon, who could think it neceſſary to do ſo harſh and hurtful a thing.

But, although in wounds of the belly or breaſt you need hardly examine the wound, ſince you cannot follow the ball, you ſhould, in wounds of the limbs, examine accurately, for there much good is to be done; there is a direct motive; there is the hope of finding the ball, and the expectation of cutting it out: This encourages us, in ſpite of any pain which the patient ſuffers; for probing is comparatively eaſy at firſt. When a man is recently wounded, the parts are deadened, the wound itſelf is ſo bruiſed, that it is, (if I may be allowed to call it ſo), a hollow gangrene; the wound being as a tube lined with dead parts, feels little at that time; but when it has inflamed, it is ſwelled, and the finger cannot paſs, it is painful, and we dare not perſevere. We do not cut a corn when it has inflamed, much leſs can we teaſe a gun-ſhot wound; and beſides, the patient in the heat of battle can look coolly upon any bloody operation, which after five days he cannot bear the thought of: Therefore, all probing ſhould be done at the time of the wound. If the patient has lain in the field, or been dragged in

carriages after a retreating army, till his wounds are inflamed, and is received into an hoſpital in that condition, he muſt be wrapt up in poultices till the eſchars have fallen, and till the ſwelling be gone; and when the wounds have ſuppurated, and come into a ſoft and eaſy condition, we may again probe the wound.

All ſurgeons prefer the finger to the probe; becauſe a muſket wound will admit the finger eaſily, the finger is not apt to catch upon tendons or nerves, it does not endanger the arteries, and by feeling with the finger, we judge moſt accurately of the condition of the wound: The finger both directs our operations, and inſtructs us in what is to be done. Perhaps we feel the ball, and then we cut directly upon it; perhaps we feel the wound making a crooked or ſpiral turn, and we follow it with our inciſions; perhaps we are ſenſible that it touches a great artery, and in working with our biſtoury, we are careful of that artery; we know alſo whether the ball has touched a joint, or broken any bone; accidents, which not only increaſe the danger, but which may even incline us in certain circumſtances to cut off the limb. In ſhort, all that we reſolve, is from the information that we have through the finger, and it directs all our operations: The finger is always in wounds of the limbs, but more eſpecially in wounds of the viſcera, to be preferred to the probe.

By theſe obſervations, then, you will learn to be prudent and gentle in probing dangerous wounds, as of the breaſt and abdomen, and ſlow in declaring your opinion: But you will be more bold and perſevering in

probing wounds of the limbs; becauſe the wounding of the joint, or the ſhattering of the bones, may, along with other conſiderations, incline you to amputate the limb; or the ball having cut the great artery, may be another reaſon why the limb cannot be ſaved; and the extracting of the ball itſelf, or of the broken bones, depends upon your feeling them. Thus, your future operations are regulated by your opinion of the wound, and the firſt of theſe operations is the ſcarification of the wound.

2. OF SCARIFYING AND DILATING GUN-SHOT WOUNDS.

Mr. Hunter reaſons thus about the dilating of wounds: "Surgeons firſt dilated wounds, becauſe of there being foreign bodies in them which it was neceſſary to extract; and they continue this practice of dilating wounds, although it is very well known that balls remaining in wounds produce ſo little danger that a modern ſurgeon would not allow himſelf to give pain, nor to make a large inciſion merely for the extracting of the ball;" yet they altered this practice, ſays Mr. Hunter, "only in ſo far as reſpected the attempt to extract extraneous bodies; for when they found from experience, that it was not neceſſary nor poſſible to extract theſe immediately, yet they did not ſee that it therefore was not neceſſary to take the previous or leading ſteps towards it." In ſhort, Mr. Hunter thinks that a uſeleſs practice is continued, after the intention of it, *viz.* the extracting of the ball, is no longer ac-

knowledged. But I am perſuaded, that were we but to look a little farther back into the hiſtory of this practice of dilating wounds, we ſhould find the ſurgeon driven from one fooliſh reaſon to another, in vindication of a practice which he ſtill found neceſſary, and ſtill could not explain. In ſhort, in this as on many other occaſions, the practice continues the ſame, while the theory changes according to the capriee of the author.

When army ſurgeons could no longer aſſign the poiſoned nature of the wound as their motive for dilating it, they found themſelves ſtill obliged to continue the practiee of dilating wounds; and on one memorable occaſion, we find the congregated colleges of ſurgeons and phyſicians aſſigning a very curious reaſon for their practiee.

The Baron De Sirot who had been lieutenant-general of the camps and armies of France, under three ſucceſſive kings, Henry IV. Louis XIII. and Louis XIV. was wounded in the thigh with a muſket ball, which broke the bone; and he was a man ſo much valued, that the Queen gave a particular order for both colleges of ſurgeons and phyſicians to conſult and adviſe upon the caſe. Four members from each college were deputed to examine the caſe, while the colleges waited each in their own hall to receive the reports. There was no doubt, in a meeting of two colleges ſome little diſagreement: but the majority determined to make inciſions "to give air to the wound;" or in plain terms, they found great collections of matter, and they knew by experience that the inciſions prevented or al-

layed the ſwelling, by "giving vent or giving air to the wound."

The purpoſes of ſcarifying are, I have told you, to open the veſſels, that they may bleed; to enlarge the wound, that when it inflames, it may have room to ſwell; and your inciſions, while they change in ſome degree, the nature of the wound, enable you to ſee to the bottom, and to take up the bleeding arteries, and to extract the ball, or the fractured bones.

In this firſt ſentence, I have mentioned all the motives for dilating theſe wounds; and you will naturally obſerve, that of theſe motives, a bleeding artery, a broken bone, or foreign bodies lying at the bottom of the wound, belong to the common principles of ſurgery; but that, independently of theſe reaſons, there are direct motives for this particular practice, which I ſhall endeavour to explain in ſuch ſimple terms, as to enable you to draw a plain inference, judging for yourſelves.

The meaning of this expreſſion, of giving vent to the wound, is to be found in the following deſcription of a deep wound in a fleſhy member. Every recent wound, admits the finger of the ſurgeon; but when after a little while, the wound in the ſkin inflames, we cannot puſh in our finger, but with force, and with pain; and when we do force our finger through the ring, or ſtricture of the outward wound, we feel plainly, that all is looſe, ſoft, and eaſy within. This ſtricture, then, or inflamed ring of the ſkin, with a deep wound, which ſwells and inflames, ſhould, when we

are ſenſible of ſuch ſtricture, induce us to open or dilate the mouth of the wound; and it is very ſingular, that army ſurgeons ſhould, with one accord, direct us to open very freely every gun-ſhot wound; while none but thoſe ſurgeons, who have ſeen few gun-ſhot wounds, venture to talk of reducing this piece of ſurgery to the common principles, which regulate our practice in other wounds. Here it is eaſy to ſee, which party we ought to follow, and we muſt continue dilating gun-ſhot wounds, till the army ſurgeons ſhall reject this rule of practice, which they introduced, and ſtill follow, and which they alone are entitled to annul.

Every man is too apt to repreſent his own conceits as the true PRINCIPLES; and whether he is ſettling diſputed points in ſurgery, or debating ſome higher queſtion in ſcience, ſtill this word PRINCIPLE, is apt to be abuſed. But ſurely, it is conſonant with all ſound principles of ſurgery, (at leaſt, in ſo far, as ſurgery is in any degree perfect), that we ſhould open every wound which has bleeding arteries, or broken bones, or where foreign bodies are lodged within it; and moſt eſpecially, it is good ſurgery to open every wound, which is of a tubular form, *i. e.* which is deep and penetrating, with a narrow opening, a tenſe faſcia over it, and an inflamed ſkin, and which muſt itſelf inflame through its whole extent: were this, which we are now treating of, a penetrating wound, inflicted by a ſharp or clean cutting weapon, it might adhere, even by the firſt intention; and we ſhould rather cover the mouth, and preſs together the ſides of ſuch a wound. But gun-ſhot wounds muſt throw off ſloughs, cannot heal

by adheſion, muſt ſuppurate, or in other terms inflame; and ſo we return to the firſt point, "that it is to make this inevitable inflammation more eaſy, that we make a ſmall longitudinal inciſion, ſo as to widen the mouth of ſuch a wound *."

The ſecond motive for dilating a gun-ſhot wound at once ſtrengthens the general argument, and teaches us to carry the inciſion a little deeper than the ſkin: for ſince the penetrating gun-ſhot wound, which paſſes through the thick fleſh of a limb, muſt inflame through all its courſe, it is very plain, that while it inflames it ſwells, and when it ſwells, the faſcia, which only bound the muſcles in the juſt degree before, muſt ſtraiten and preſs them. From this ſtraitening proceeds a corded feeling of the wounded limb, a higher inflammation, a crampiſh pain, convulſive twitchings of the limb, ſometimes locked jaw, and ſometimes death. From the anxiety with which Ravaton and Le Dran direct us to cut this tenſe faſcia with a large crucial inciſion, we are ſure that they had juſt ſuch

* Mr. Hunter ſays, "open or ſcarify a wound as freely as you may think neceſſary, I will engage, that it will be, in a month's time, in the ſame ſtate with a ſimilar wound which has not been opened;" which argument is a very unfortunate one on Mr. Hunter's part; for it proves this plainly, that whatever good ſuch ſcarifications may do, at leaſt, they will do no harm; they may ſave the patient from pain, from high inflammation, or from nervous ſymptoms, ſuch as often follow an inflamed faſcia in bleeding of the arm; and that ſtill "the wound will be in a month as nearly heal, as if it had not been opened;" in ſhort, the quick healing of this ſcarified wound is ſo particular, as to be obſerved, even by thoſe who are the moſt averſe from this practice of ſcarifying wounds.

ideas, and ſuch motives as theſe, for their practice; but thoſe who are harping always upon the old ſtring of principles, ſhall alſo be ſatisfied that this practice belongs fairly to the ſurgery of common wounds, and *a fortiori* in a particular manner to gun-ſhot wounds.

A young woman, a ſervant in the country, had a fall from a cart, and by her elbow lighting upon a ſharp ſtone, ſhe received an angular wound by which the ſkin and the faſcia were torn. This lacerated wound was about a inch in length, and the faſcia at this point of the arm where it is ſtrongeſt, was ſo lacerated, that its ragged edges projected through the wound. There came on a deep coloured inflammation, accompanied with a deep-ſeated dreadful pain of the whole arm: She had reſtleſs nights, fearful dreams, weakening ſweats; ſhe could not move her arm, nor ſuffer it to be moved; her diſtreſs was continually increaſing for ten days, when ſhe ſeemed in great danger of her life. The ſurgeon then ventured to make an inciſion through the ſkin and faſcia two inches long: The faſcia inſtantly flew open; all the dangerous ſymptoms were at once removed; and next day, inſtead of the gleety diſcharge which had hitherto come from the wound, there came good pus, and the whole wound and inciſion healed quickly, leaving only a degree of weakneſs behind. In this, and in ſimilar caſes, the faſcia flies open with an impetus which ſhows its tenſion, and with ſuch inſtant relief of pain, as demonſtrates in a manner the neceſſity and the good effects of the inciſion. The analo-

gy here is very direct and fair; it might be ſtrengthened with numberleſs caſes of the ſame nature, more prolix indeed in their detail, but not more deciſive with regard to the great point at iſſue; and among theſe, there is one caſe which ſtands out very prominent from all the reſt, where the faſcia was four times divided always with perfect relief, but always as the faſcia healed, the contraction of the arm, the ſpaſmodic diſeaſe of the whole ſyſtem, the reſtleſs nights, fearful dreams, pain, fever, and weakneſs returned; till at laſt, by a random ſtroke, rather than by any well conceived deſign of the ſurgeon, the faſcia was fairly cut acroſs at the place where it is braced down by its connection with the long tendon of the Biceps Muſcle, and then only, *viz.* at the fourth inciſion, the patient was entirely relieved. "Now, ſays ſhe, you have indeed cut the cord which bound my arm;" and ſhe toſſed her arm freely, and with great exultation. In ſhort, this is a caſe on which I would inſiſt much; for if I could afford time to detail at full length the circumſtances of it, you would find theſe four ſucceſſive operations to reſemble rather four regular experiments contrived for the very purpoſe of proving how dreadful the diſtreſs ariſing from a tenſe faſcia is, and how ſure the relief is every time that the faſcia is opened, and how ſurely the diſtreſs returns every time that the faſcia is allowed to cloſe; and how perfect the relief is whenever the faſcia is decidedly and fairly cut acroſs. In ſhort, with ſuch analogies before him, no ſurgeon, however averſe from the dilatation of gun-ſhot wounds, can refuſe his

aſſent to this ſecond rule, " that wherever we dilate the mouth of a gun-ſhot wound, the inciſion ſhould paſs through the faſcia, as well as through the ſkin ;" and that whenever the ſymptoms of a tight faſcia come on, we ſhould be careful to open the wound anew, and to make the faſcia quite free.

Theſe inciſions are not ſevere ; the very purpoſe of them, is to abate inflammation ; they are done early when the wound is almoſt inſenſible, the patient feels little pain in the preſent time, and owes to theſe inciſions, much of his future comfort and eaſe ; we are particularly well aſſured, that they do not retard the healing of the wound, " which is as far advanced in a month, as if it had not been touched with the knife ;" in ſhort, though the wound will often heal without ſcarifying, yet here, as in every other neceſſary operation, the patient has a chance of eſcaping much pain and danger, by ſubmitting in the firſt inſtance, to a trifling pain, attended with no danger, nor any conſequences, but what are good.

Thus, you perceive, that the firſt great point to be eſtabliſhed, is the propriety of ſcarifying thoſe wounds, in which the tenſion of the faſcia, the ſwelling and tenſion of the limb, the confinement of the matter, or the manifeſt conſtriction of the orifice, make it neceſſary to give this relief; and as for the dilatation of thoſe wounds, in which there is a bleeding artery, ſhattered bones, or ſome foreign body remaining within the wound, that is a buſineſs too plain to need argument ; and therefore ſuppoſing the principle to be acknowleged, I ſhall next proceed to repreſent the

practice; the ſubjects, therefore, which remain to be explained, are the intention of counter openings; the uſe of ſetons, the extraction of balls, or of ſplinters of bone, and the way in which we manage the bleedings from gun-ſhot wounds.

1ſt, A COUNTER OPENING, is the opening which the ball itſelf makes behind in paſſing through a limb; or that which the ſurgeon makes for the extraction of the ball, when it has not paſſed quite through and through.—The greateſt army ſurgeons, who were alſo, it ſhould be remembered, the moſt eminent private ſurgeons in the greateſt cities of the world, have adviſed us always to make a counter opening, and extract the ball; they order this in the moſt direct terms, where the ball is near, or directly under the ſkin. Some of the moſt famous ſurgeons adviſe, that we ſhould extract the ball by a counter opening, even when it has paſſed only two thirds through the limb. Mr. John Hunter, alone, diſapproves of this: He ſays, that it will raiſe a high inflammation, paſſing along the whole canal of the wound. He adviſes that we refrain from this opening, till we have firſt healed the gun-ſhot wound, and then, we may without danger, make our incifion to extract the ball. But the anſwer is plainly this, that the inflammation of a gun-ſhot wound very ſeldom runs to any dangerous height, except from a ball bruiſing the limb, or from broken bones; the anxiety of the patient to have his ball cut out, is ſo great, that this of itſelf, is ſome motive; he may be gratified in this point with no danger, and with little pain: Army ſurgeons continue this practice, and

unleſs Mr. Hunter had been the greateſt army ſurgeon, as ſurely he was one of the moſt eminent ſurgeons in private life, his hypotheſis, put in competition with their practice, muſt not ſtand.

But there is alſo another kind of counter opening, which the ſurgeon is at times obliged to practice; I mean the opening which he muſt make in the middle of a long wound, when the track of the wound ſwells, or when the abſceſs forms, and the matter, the ſloughs, and the foul ichor ſeem to be confined.

For example, a man is wounded by a ball, which breaks one or two of the fingers, pierces the hand, runs up the fore arm, rakes along the bones, and goes out far from its entrance, as at the elbow, or at the ſhoulder joint: Here we can hardly prevent a long ſuppuration, and too often, an exfoliation or ſpoiling of the bones; and three openings are required, one where the ball entered, another at the counter opening, or that by which the ball paſſed out; and if ſwelling, pain, irritation, or perhaps nervous ſymptoms come on, then there will be required alſo another opening in the middle of the wound. Such an opening will eaſe the ſwelling, and prevent a ſuffocation, (if I may expreſs it ſo), of the wound; it will prevent gangrene, bring on a good ſuppuration, and allow a free vent for the matter; it will alſo prevent ſinuſes, and ſo ſave the arm, which from frequent collections of matter along the courſe of a long bone, muſt be in ſome danger; and there is one good effect of ſuch an inciſion, that it will ſave us from the ſevere, or rather cruel practice of the older ſurgeons, who were ac-

cuſtomed, in ſuch caſes, to run a large ſeton through the tube of the longeſt wound.

2*dly*, The *true uſe of a ſeton*, falls next to be diſcuſſed; for though the indiſcriminate uſe of ſetons muſt be condemned, we muſt acknowledge, certain circumſtances in which they ſhould be uſed; but not as the older ſurgeons uſed them. It is manifeſt, ſay thoſe older ſurgeons, that ſetons will give free admiſſion to our medicines, will preſerve a free drain for the matter, will encourage the ſuppuration, and will ſhake the fractured bones. Now, as for the medicines that are to be introduced, we know of none which can be uſeful; the matter ſurely will make way for itſelf; ſetons will, no doubt, promote ſuppuration, and ſupport it! but they will do ſo juſt in the ſame way, that a ball ſticking at the bottom of the wound, or a piece of the ſoldier's coat or veſt, will encourage ſuppuration, *i. e.* by irritation and pain, attended often with ſo high a ſwelling, that the ſeton muſt be ſuddenly withdrawn.

But when I ſay, that "this ſevere or rather cruel practice," I mean only the running up a ſeton through a freſh wound, where the expectation of its quickening the fall of the ſloughs is no apology for this needleſs pain. In the firſt moment of the wound, it is not unuſual, with a long probe, to draw through the tube of the wound a ſkein of cotton, which, if there be any piece of cloth, or ſplinters of bone, or balls, it will ſometimes entangle them, and draw them out, ſo as to prevent tedious ſuppurations and ſinous ulcers. But there is no motive for keeping the cord

in any recent wound, accompanied with irritation and pain, and a rising inflammation; this cord is therefore immediately withdrawn; but there is an after-stage, in which this long wound having become fistulous, and of a callous hardness through its whole length, will not heal.——And this slow cure may be attributed to one or other of these two causes.——— First, That the wound having become entirely callous, pours out a profuse gleety discharge; its vessels permitting their fluids to escape thus, through mere relaxation, while they are incapable of that degree of inflammatory action by which the wound should heal. ——Secondly, That there may remain some foreign body within the wound: Now a ball never produces these symptoms; a broken and corrupted bone would presently be known by the black colour and fetid smell of the discharge; and if the slow healing of the wound is known to proceed from neither of these causes, then most likely it arises from some piece of cloth which has passed in along with the ball; and though sometimes we may excite such a wound as this, by stimulant injections, or wash out any piece of cloth by milder injections of tepid water; yet clearly the best way of exciting a healthy action in such a fistulous sore, or of entangling any foreign body, is to run a seton through the wound, to draw it for a few days; if in that time, it either does harm, or does no good, let it be withdrawn; and if the wound be truly callous, and really requires this harsh treatment, it will also be able to bear it without either danger or pain*.

* However useful, or rather allowable, setons may be in flesh-

3. OF THE EXTRACTION OF BALLS, CLOTH, OR SPLINTERS OF BONE.

THE endeavours which you make for extracting the ball, muſt be infinitely varied, according to the circumſtances of the caſe; and there can be given hardly any more ſpecific direction than this one, to uſe your finger more than forceps, and to get the ball out, rather by making free inciſions, ſo as to touch it, than by painful and ineffectual gropings in a deep and narrow wound; for forceps are not quite ſafe, and ſcrews are very dangerous, and not to be uſed: You muſt have crow's bill and crane's bill forceps of various forms; and often by pointing with the finger, you can make them touch the ball, before opening them to graſp it; but you muſt not uſe thoſe fooliſh ſcrews, called TIRE-BALLS, which are only to be paſſed deep into the wound, where the finger cannot go to guide them; and which, you may be aſſured, are as likely to be fixed into the bone as into the ball, although no doubt the ball is generally flattened by ſtriking the bone. As for the DILATORS, they belong to the armoury of the old ſurgeons; for they were uſed for dilating, or to ſpeak plainly, for tearing the wounds open, in the times before Parée, when not being able to take up an artery, the ſur-

wounds, I cannot think them prudent or harmleſs, in caſes where there are broken bones or a wounded joint; for there the inflammation is apt to run too high, and the ſuppurations are but too profuſe; and I proteſt, abſolutely, againſt the ſetons being run acroſs the cavities of the thorax or abdomen; yet it is in ſuch caſes, chiefly that tents and ſetons have been uſed; and therefore I ſhall need to take up this queſtion again, when ſpeaking of wounds in the breaſt.

geons never dilated with the knife, nor ever uſed the knife, even upon the moſt neceſſary occaſions, but with fear and trembling, and with their cauterizing irons ready to ſear the arteries with, before any operation was begun.

If a ball have paſſed quite through a limb, it is well; if it have paſſed nearly through, but ſtopt at the ſkin, (which is very tough), then the counter opening takes it out; if the ball has paſſed more than two thirds through the limb, it will ſtill be eaſier to take it out by a counter opening, than to ſeek for it with forceps at ſo great a depth; or rather, perhaps, it ſhould be left. If a ball be ſtopt by a bone, it may have ſpent its force, and may have been flattened ſlightly without breaking much of the bone; then it is to be got away with inciſions, and the finger or forceps: But if a ball well charged, and fired from a moderate diſtance, hit upon a bone, it will go directly through, ſhiver the bone and break it acroſs; then the ball and ſplinters are to be diligently taken away, and it is to be treated as a fractured limb of the moſt dangerous kind; but if a ball in the ſame circumſtance, hit any broad and ſpongy part, as the head of the tibia or the condyles of the thigh-bone, it enters into the bone, and ſticks there. The ball cannot remain there, without cauſing a caries of the bone; it cannot be eaſily extracted, for it is flattened and nitched into the ſhattered bone; then there muſt be a free inciſion made, and the trepan applied; or if it be a narrow and firm bone, M. de la Faye orders us to cut the

bone both above and below, ſo as to cut away that piece in which the ball is fixed.

But ſtill let it be remembered, that it is only the openneſs of the wound, and the nearneſs of the ball, that tempts us to ſearch for it; for a ball ſometimes works its way outwards through the cellular ſubſtance, and comes to the ſurface with little pain, or often it lies without danger buried in the fleſh, for years, or for life. If there were no other occaſion for opening the wound, we ſhould never give the patient pain on account of the ball, ſince it ſeldom itſelf gives him pain. It is chiefly, I ſay, the openneſs of the wound, the nearneſs of the ball to the ſurface, and the anxiety of the patient about it, that tempt us to ſearch for it or to cut it out. It is chiefly on account of broken bones, or a wounded artery, that we are to enlarge or dilate the wound *.

* There is this difference betwixt ſcarifying and dilating the wounds, that ſcarifying is that ſuperficial inciſion of the mouth of the wound by which we relieve the tenſion of the faſcia, or the ſtricture of the ſkin; but *dilating* is that deeper inciſion, which we make by puſhing our finger deep, and to the bottom of the wound, following it with the biſtoury, to make a free way for getting at the bleeding artery, or extracting the fractured bone. (*e. g.*) If there be a muſket wound acroſs the fleſhy part of the thigh, we *ſcarify* both the openings; but if there be a ſhot paſſing through the thick part of the foot, we *dilate* the wounds largely upon each ſide, cut away the ragged tendons, and ſo have free openings for the ſuppuration and ſloughing, and for the many fragments of the Tarſal bones which muſt come away.—In ſlighter wounds where the ball does not penetrate a fleſhy part, as the thigh, where no bone is broken, nor no artery wounded; we refrain from all kind of ſurgery, and merely apply a piece of dry lint to the wound.

If there be a cruſhing of the bone and many ſplinters, you will naturally try to get away thoſe which are looſe; be diligent in removing them with your fingers, or in picking with your lever, or even in pulling them out with your ball forceps. But there is a certain point at which your diſcretion muſt ſtop you; though the ſplinters are looſe and ſeem to be loſt, yet they are ſtill attached by their membranes, and may live and may be taken into the knot of callus which reunites the bone. You never know what pieces are entirely uſeleſs, and you ſhould never be violent in tearing up the larger pieces; and as for the ſmaller ſplinters, they never are ſo looſe as to be waſhed away. The injections which many throw into the wounds, are very fooliſh in the opinion of the great Hildanus, who illuſtrates his objection by a very humble ſimile: "Let the ſervant-maid, ſays he, waſh the piece of meat which ſhe has in her hand ever ſo carefully, yet after all her care, and after thorough boiling, the ſplinters of bone will adhere." Therefore, it is the advice of the oldeſt and moſt reſpectable ſurgeons, to leave them to be looſened by ſuppuration, rather than to tear them up with the forceps.

I ſhall conclude this head, by remarking to you how diſtreſſing it is when foreign bodies are neglected, and remain in the wound.

If any foreign body remain in a wound, the conſequence is, that the cure which goes on in a promiſing way for ſome time, ſtops all at once; the wound which looked freſh, and was ſuppurating well, turns pale and flabby, diſcharges a thin ſerum, and begins to diſorder

the whole ſyſtem: for preſently an evening fever and a weakening diarrhœa ſucceed; or perhaps the wound ſeems actually healed, but it is not found within; the action of the muſcles forces the ſurrounding parts to preſs upon the foreign body, and accordingly the ſurrounding parts inflame, ſuppurate, form an abſceſs; the abſceſs burſts, and diſcharges much ill-ſmelling matter, but yet the piece of cloth or ſplinter of bone is not diſcharged; and thus the wound ſuppurates and burſts from month to month, keeping the patient in ſome danger and much diſtreſs.

A cannoneer on one of the redoubts of La Hogue, was firing upon ſome Engliſh frigates; the gun burſt, and he was wounded in the thigh, by one ſmall ſplinter only. La Motte, who was ſurgeon to that line of batteries and entrenchments, was ordered by the commander to dreſs the gunner; but the young man having a ſurgeon who was his brother-in-law, could not but think himſelf ſafer in his hands; for three weeks, his wound was getting worſe daily, and he was weakened by frequent hæmorrhages, which his brother-in-law, and thoſe who aſſiſted him, could neither account for nor manage. The commander once more, ordered La Motte to attend to the gunner, who was a very fine fellow: La Motte ſearched the wound in two or three places with his finger: at laſt, he found one opening particularly deep, which they had never probed, and puſhing his finger to the bottom of it, he felt a ſmall ſplinter of the gun, no bigger than an almond *,

* Obſerve, that an angular ſplinter of an iron or braſs gun, is very different from a leaden ball, which might have lain quite eaſy, the wound healing over it.

lying betwixt the thigh bone and the great artery, which he felt beating; this was the cauſe of all the diſtreſs, and after it was extracted, the patient never had a bad ſymptom, but was cured of this very deep wound in three weeks *.

In the ſame way, Ravaton had tried to cure a young man, a Captain of foot, but in vain, while the foreign bodies remained. When this officer came firſt under Ravaton's care, he had a large wound in the top of the thigh, from which Ravaton had, at the time of the wound, extracted a muſket ball; he continued under Mr. Ravaton, growing worſe and worſe daily, for three months, during all which time he had continual pain, and frequent diarrhœas, by which he was extremely waſted: His pain was dreadful, and he had ſuch inflammation, and abſceſſes in the thigh, as occaſioned Mr. Ravaton to make five openings with his lancet, on account of collections of matter: At laſt, after a night of very great pain, there burſt out a flood of confined matter, from the wound in the thigh. Mr. Ravaton introducing his probe into this cavity, felt a foreign body at the bottom of it, and enlarging it a little, he put in his hand (for the ſore was now large enough to admit his hand), into the thigh, and thence he drew out a ſmall copper key, the key of his eſcrutoire; three ſmall pieces of a ſilver ſeal; and no leſs than thirteen very ſmall fragments of the carnelian ſtone belonging to the ſeal.

* La Motte.—Vol. IV. p. 184.

4. OF THE BLEEDING FROM GUN-SHOT WOUNDS.

The bleeding from gun-ſhot wounds remains to be explained; and I need not tell you, that wherever there is bleeding from a gun-ſhot wound, it muſt be a deſperate bleeding, from which your patient can be ſaved only by the greateſt boldneſs and judgment on your part. It muſt be a dreadful bleeding; becauſe it is againſt the nature of gun-ſhot wounds to bleed; their bleeding is a ſign of ſome great artery being cut; and judgment is as much needed as boldneſs; becauſe, in this caſe, even the patient's lying eaſy for ten days is no ſecurity againſt bleeding; and your anatomical ſkill is ſhown by your knowing when the ball has bruſhed cloſe by a great artery, and by that, and by other marks, whether a profuſe bleeding is really dangerous.

Since there is naturally no bleeding from gun-ſhot wounds, to find much blood ſpouting from a wound, is extremely alarming; nothing is more likely than that ſome great veſſel is cut; and whether it be the thigh, or ham, or arm, that is wounded, although we will not allow ourſelves to do any thing raſh, we muſt inſtantly make bold inciſions, guided by the finger, until we ſee the bleeding artery, and tie it up. It has been an axiom of ſurgery, ever ſince Parée's invention of the needle, that we may ſtem a hæmorrhage either by ſtyptics, or by compreſſion, or by tying the artery; but in this caſe, there is hardly that choice. If we truſt to ſtyptics, what will become of our patient, who is hurried from the battle, into a cart, and driven along the roughеſt roads,

from poſt to poſt; and, until he arrives at the General Hoſpital, never has a ſurgeon at hand to ſtop the blood? If we intend compreſſion, and ſo cram the wound with lint, then a firm bandage is required, and either the bandage is ſlackened during this dangerous journey, or the poor ſoldier finds it drawn ſo tight, as to occaſion dreadful pain, and arrives at ſome General Hoſpital, with his limb ſwelled to ſuch a degree, that either it is gangrenous already, or is inclined to run into gangrene. For theſe reaſons, arteries wounded in the field of battle, never can be truſted with a compreſs; in ſuch circumſtances, nothing is ſecure, but a free inciſion, and a fair tying with the needle; and it is indeed remarkable, that none but the army-ſurgeons underſtood the value of the needle, when it firſt came into uſe. "I condemn, ſays Le Dran, that ſort of compreſſion, which is made by cramming the wound with dry lint:" indeed we may ſay, with ſtrict propriety, it only conceals the danger; it ſuppreſſes the bleeding for a time, to break out more furiouſly, when we are leaſt prepared; it ſmothers, but does not extinguiſh the fire.

But the ſecondary hæmorrhage is ſtill more to be feared, as the hidden danger is always greater than the open danger; for, as I have ſaid, "the patient's lying eaſy even for ten days, is no ſecurity that in the end he ſhall not bleed to death." Every circumſtance concurs to lull us into a fatal ſecurity; the patient lies eaſy, and tolerably free from pain; there is no fever, there has been no bleeding; even at the firſt the wound was ſcarcely ſtained with blood; on

the eighth day, the eſchar of mortified and bruiſed parts begins to looſen; on the ninth or tenth day, the ſloughs begin to fall; and if this partial gangrene has touched the coats of a great artery, the ſloughing of theſe coats leaves a breach in its ſide; the blood burſts out impetuouſly, and it is not that the patient may die of a ſort of ſlow bleeding, betwixt night and morning, but he dies in a moment. Ranby tells us, that by ſuch bleedings, he had ſeen a man die, who had loſt no more than twelve ounces of blood; the loſs indeed is ſmall, and ſuch a ſudden death may be mentioned as ſurpriſing; but it is not unnatural, when ſuch a quantity burſts out from a great veſſel, and is ſo ſuddenly poured out, that the balance of the ſyſtem, and that reſiſtance which keeps up the excitement of the heart and of all the arteries, ſhould be loſt in a moment, and the man die. Surely the knowing of ſuch things as this, muſt be a cauſe of great anxiety, and a motive for continual watchfulneſs to the ſurgeon. The watching is a kind of duty which no ſingle man can fulfil; but mates and pupils ſhould be appointed to watch, who can anſwer for the event; and thoſe patients who have wounds near the greater arteries, ſhould ſleep with tourniquets round their limbs, ready to be ſcrewed.

But whether it be an immediate, or a ſecondary bleeding, the conſequences are of the moſt ſerious nature: For, firſt, There is the preſent danger of immediate death, from the bleeding: Secondly, There is another danger, viz. of aneuriſms, formed by the open arteries, that is, of great ſacs of blood, formed near the

wound, which may require a tedious diſſection, for emptying the bag, and for tying up the wounded veſſel: Thirdly, If the arteries continue open, and burſting out from time to time, then every burſting out of the arteries, will both endanger the patient by the open loſs of blood, and will cram the leg with inward bleeding; ſo that the extravaſated blood will fill the interſtices of the muſcles; produce foul ſuppurations, and gangrenous ſloughs; and will in the end, cauſe a corruption of the bones; ſo that it were better for a man to loſe his leg at once, than to be thus long in miſery, with ſo poor a chance of ſaving it.

Perhaps, the beſt general rule will reſult from my explaining to you, once more, in a few words, the intentions and motives for dilating gun-ſhot wounds; many ſlighter wounds do not require to be ſcarified; and where we do ſcarify, or rather dilate a gun-ſhot wound, it is in proportion to the ſize of the limb, the deepneſs of the wound, the ſmallneſs of the openings, or their diſtance from each other; we open or dilate, quite to the bottom, every great wound in which any great artery bleeds, or in which there are many great fragments of ſhattered bones. The ball itſelf is the only foreign body, about which we are leſs careful, ſince it is often lodged among the muſcles, makes a ſac for itſelf, excites no pain, and lies there harmleſs, exciting no inflammation nor pain, for years, or perhaps for life. And when the time arrives, in which the wound ſhould heal, but does not heal, we paſs through every ſuch callous ſore, a ſkein of ſeton,

eſpecially if we ſuſpect that any piece of the cloths carried in by the ball has been left behind.

Thus you ſee that this dilating or ſcarifying is the chief point in the treatment of a gun-ſhot wound; and you will alſo obſerve, that the wounded artery abſolutely requires this dilatation; the fractured bone alſo requires it; the fleſh wound needs it leſs. The wound acroſs the cavities, as acroſs the breaſt, hardly needs, or indeed allows of this dilating; for there is no part which is tenſe, or which needs to ſlough, except the ſkin, and outward wound; and all the reſt is, as Mr. Pouteau ſays of the wounded bladder, "like a ſtroke in the water:" Thus there is no tenſion, no ſwelling, no continued ſloughing; in this, the deepeſt wound, there is no depth of wound: the outward wounds indeed muſt throw off a ſuperficial eſchar, but all the inward wounds of the pleura and lungs ſeem to adhere; and we are often ſurpriſed with a very ſudden, and very happy cure.

By all this it will appear to you, that the motives forſc arifying gun-ſhot wounds, are juſt ſuch as you would acknowledge, in the treatment of common wounds; that the principles being once taught to the young ſurgeon, all the reſt muſt be left to his diſcretion and good ſenſe: That theſe motives are ſometimes urgent, ſometimes trifling; and that this ſcarification or dilatation muſt be boldly done, or partially done, or quite neglected, according to the exigencies of the caſe.

DISCOURSE VII.

OF WOUNDS WITH THE SWORD OR BAYONET, OR ANY CLEAN CUTTING WEAPON.

I AM now to keep my promiſe, of collecting the minutiæ and details of practice, into a few general rules; which will give a more regular concluſion to a diſtracting and intricate ſubject. The ſpeculations on gunſhot wounds are of very little importance in the eye of the modern ſurgeon; that gun-ſhot wounds are poiſoned, is not at the preſent day, a matter of debate; but it is known that they are juſt as difficult to heal, as if burnt or poiſoned, and of this difficulty, even the outward appearance of the wound gives the ſtrongeſt indications.

1ſt, In wounds of the viſcera, you are not to introduce your probe with that unfeeling boldneſs, which makes every repetition of the practice, a freſh ſtab; uſe your finger only; uſe that, too, ſparingly; truſt rather to the eye; look to the general condition of the patient, and the courſe of the ball; wait quietly for the ſymptoms, and be guided by them.

2*dly*, Probe with greater freedom and boldneſs in wounds of the limbs, and ſearch carefully for the ball, or cloth, or ſplinters of bone; for your future operations are ſucceſsful, only in proportion as the condition of the wound is well underſtood.——But if the patient have lain long upon the field, or have been carried in a wagon; if from any cauſe his wound be already inflamed, you muſt refrain from ſearching; for it is too late to extract the ball, and you muſt wait (laying the limb eaſy) till the ſuppuration be formed.

3*dly*, The common term, "ſcarifying of gun-ſhot wounds," is an unlucky one; for we uſe a word which implies but a ſuperficial cutting, to explain what it never can explain, a deep and bold inciſion, for extracting broken bones, or for tying wounded arteries; which muſt be made large, in proportion to the ſize of the limb, not ſuperficial in the ſkin only, but alſo into the faſcia which binds the muſcles; ſometimes it muſt go down alſo among the muſcular fleſh. This unlucky word, ſcarifying the wound, and the ſenſe in which young ſurgeons have underſtood it, and the making of ſuperficial inciſions, which can never be uſeful, and of ſcarifying indifferently all kinds of wounds, has been the occaſion of ſo much doubt concerning the propriety of dilating wounds. There may be required three inciſions in a long wound; there muſt be two in every wound which paſſes through a member; there muſt be a wider inciſion where the ball is loſt in the limb; and this ſingle inciſion ſhould be ſo freely made, as to change the wound from one penetrating and wide at the bottom, to a wound quite open.

and much larger at its mouth; or, in plain terms, it is in proportion to its deepneſs, that we open the mouth of a wound.

4*thly*, If there be bleeding from a gun-ſhot wound, you are ſure that it is no common bleeding, that it comes, not from the ſmaller arteries, which are too much bruiſed to bleed, but from ſome great veſſel, which you dare not for a moment neglect: You muſt apply your tourniquet, make bold inciſions, and look fairly down into the bottom of the wound, that you may apply your ligature ſurely; and ſince a gun ſhot wound is in general bloodleſs, the want of bleeding is no ſecurity that no great artery is hurt; for if the ball has bruſhed by the ſide of the Femoral or Tibial arteries, an eſchar will fall off from the artery, as from the other bruiſed parts, and there will be a breach in its ſide: Therefore, whenever a great artery is hurt, you muſt take meaſures not to be ſurpriſed; if, in putting in your finger, you have felt the beating of ſuch an artery from the wound, you muſt watch with care from the fifth, to the fifteenth day; watch always, while the ſloughs are falling off; and a beating or throbbing in the wounded limb will often forewarn you of the danger.

5*thly*, Inſtead of uſing ſetons or tents to keep the wound open, you ſhould ſeek relief from free inciſions; and, inſtead of hot and ſpirituous applications, (which uſed to be put to thoſe wounds, when they were thought to be poiſoned, the lips looking gangrenous or livid), lay the wounded limb in large poultices, eaſy and ſoft, which will at once encourage a

kindly ſuppuration, and aſſuage the pain; but as ſoon the pain is abated, and the ſuppuration eſtabliſhed, and the ſloughs beginning to be diſcharged, the poultice muſt be removed, for the continued uſe of it will but increaſe the relaxation, the fetor, and the profuſe diſcharge.

6thly You will ſee that there is no dreſſing peculiar to gun-ſhot wounds; that they are peculiar, rather, in admitting of none. The French ſurgeons uſed to employ themſelves and their attendants in rolling long bandages with curious neatneſs, and intricate reverſes and turnings, which, though they might keep up the parade of ſurgery, occaſioned ſo much pain to the patients, that they were ridiculed even in the French Academy, and by their own great ſurgeon Le Dran. There are now none of theſe bandages uſed, which you ſee ſo finically drawn in books; no ſetons are drawn through the wounds loaded with medicines, always of doubtful, ſometimes of a very miſchievous and irritating nature; no ſpirituous applications, which might be conſidered us the real poiſons, nor any burning with cauſtics or oils, which indeed they uſed hot enough to melt the very ball with which the wound was ſuppoſed to be burnt; we do nothing now but wrap the limb in a large, ſoft, warm, and comfortable, oily poultice; in ſhort, we in Scotland call a poultice a bath; and if you will make every poultice, literally, a bath for the limb, you will do your patient great juſtice; poultices, in the firſt inflammatory ſtage, are the propereſt applications; ſetons at ſuch a time are irritating and dangerous;

the old apology for uſing them, *viz.* the bringing out the ſloughs, is a very abſurd one: Setons, injections, and bandages are never to be uſed till the wound have degenerated into a fiſtulous ſore.

Theſe rules repreſent to you now, at once, both the peculiar nature of gun-ſhot wounds, and the intention and manner of treating them; of ſearching wounds, of enlarging them; of ſecuring arteries, and of extracting balls; and I am very ſure, that I have been ſo orderly, that I can neither have omitted, nor ſlighted any rule of real importance. But beſides this, an army ſurgeon muſt underſtand the nature of other wounds; and indeed, upon comparing gun-ſhot wounds with cuts of a ſabre, ſtabs of the bayonet, or thruſts of the ſmall ſword, we find them differing in all the eſſential points; they are not bruiſed nor gangrenous; not dangerous from after bleeding, nor tedious from caſting off ſloughs; there are no motives for ſcarifying; nor are there any painful extractions of foreign bodies; no ſlow exfoliations, nor irregular ſuppurations, nor new abſceſſes appearing juſt when the wound ſhould heal. But, on the contrary, ſabre wounds are eaſily reunited, like the flaps made by the ſurgeon's knife; and even bayonet wounds among the viſcera are ſo very different from gun-ſhot wounds, that when the firſt dangers are over, we pronounce the patient ſafe; nay, I ſhall have occaſion to explain to you, upon rational principles, ſome recoveries from bayonet wounds, which look more as if they had been owing to the art of magic, than regular ſurgery; recoveries of men whoſe breaſts had

been fairly transfixed with the weapon, and the wound managed in ſo peculiar a manner, that they have been walking in the ſtreets, ſound and well, in a few days.

Here then you enter upon a new line of practice; forſake entirely the probings and inciſions of gun-ſhot wounds, expecting to perform the cure upon eaſier terms. For when there is a fair cut, put it together, and it will heal; when there is a large flap made by a ſabre, put it down as confidently as if you had made it in ſome regular operation, and it will adhere: even when there is a penetrating wound, far from opening it with inciſions, cloſe it with a compreſs, and put its ſides together by a rolled bandage; and if there be no open artery to fill it with blood, even this penetrating wound will cloſe, and be obliterated in a few days.

Theſe are ſimple facts, proved by every day's experience; upon the rules therefore reſulting from them we can rely; but they are ſo unlike all the principles and practices which I have recommended hitherto in penetrating wounds, that I find the ſimple enunciation of them will not be ſufficient: It is neceſſary then, that each of theſe three rules ſhould be expanded by repreſenting the accidents of real practice.

I. The firſt rule is, That where there is a fair cut, or even a flap of the largeſt ſize, put the wound together, or lay down the flap, and it will adhere.

When a ſabre cut upon the head flaps down the ſcalp, and lays bare the ſcull, too often ſuch a flap is

CUT AWAY, and the bone ſpoils; and not ſeldom, after ſuch imprudence on the part of the ſurgeon, the brain is affected with the inflammation, and the patient dies. But if the weapon have touched the ſcull itſelf, and if but a ſmall piece of the outer table only be razed, then, without any motive, and againſt all rules of good ſurgery, the ſurgeon very often applies the trepan. Here there is no motive for applying the trepan, for there is merely a clean cut paſſing ſidelong through the ſcull, ſo that there is no heavy blow ſuch as might hurt the brain; there will moſt likely be no extravaſated blood; very often the patient rides into the camp, and comes himſelf to be dreſſed to his ſurgeon's tent. I do not ſay that in ſuch caſe there can be no danger, the brain may certainly inflame; but at the time of ſuch a wound there is neither inflammation of the brain, nor any actual wound of it; and the moſt effectual way of preventing every danger is, to put down the flap immediately, and cover up the wound. If there be any real danger, ſuppuration will come on, and the flap will never adhere; but if there be no danger, the flap, even though laid upon the naked brain, will adhere as in a common wound; therefore, either after cutting away the piece of bone, the flap may be laid down, or the piece of bone ſtill ſticking ſoundly to the flap, may alſo be preſerved, and laid down along with the flap; and being a living part, and having its circulating veſſels, will adhere.

This is a fact of ſome importance; it has been but little obſerved till of late years: It was thought to be a new diſcovery, when Mr. Meinors, a ſurgeon, publiſh-

ed, in a periodical paper, that he had laid down the ſcalp, and made it adhere, after a great operation of trepan. But Mr. Meinors, like many young ſurgeons, has been too little employed in ſtudying the older ones, and has, like too many inventors of old diſcoveries, ſpoken vainly of a practice which is two hundred years old; for Berengarius Carpenſis, an old Italian ſurgeon, not only knew how to ſave the ſcalp, but he knew alſo that we might very ſafely lay down a piece of the ſcull itſelf, provided only the cut was clean. He tells us of a ſoldier, who was ſo wounded, I believe with a halbert, that the greater part of the frontal bone was cut quite down to the orbit; the frontal bone was ſtill connected with its ſkin, and the ſkin and the bone together hung down flapping over the eyes. My father, ſays Berengarius, being called, cut the bone away from the ſcalp, laid the ſkin up again upon the forehead, ſewed it in its place, covered the ſtitches and the wound with whites of eggs, it adhered, and after ten days dreſſing, the cure was perfect, and the pulſations of the brain were felt where the bone was loſt. He confirms this practice by other caſes, in which he had ventured alſo to put down the bone. Le Dran gives the ſame direction for ſabre wounds; and Parée tells us, that a captain was ſo cut with a ſabre in the parietal bone, that the dura mater was expoſed, beating, and the bone was cut ſo cleanly, that it was turned back over the face, remaining attached only to the flap of ſkin. Three fingers breadth of the bone was thus cut up, and Parée was about to cut it away, when, recollecting Hippocrates's rule, of never expoſing the

dura mater, he put it back into its place, ſewed it there with three points of the needle, and made a perfect cure.

The difference between gun-ſhot wounds and the clean cut of the ſabre is ſo great, that while a touch upon the head, by the grazing of an oblique ball, is very commonly fatal, it often happens that a ſoldier eſcapes, whoſe head has been ſo cut with the ſabre as to loſe the bone and ſcalp, and even a part of the dura mater, with a wound, even of the brain itſelf, which requires many months to cure. In theſe curious facts I ſhould like to inſtruct you more fully, by comparing ſuch intereſting caſes with each other; but I muſt rather paſs on to obſerve one thing more concerning fleſh-wounds, which is not leſs intereſting, viz. That a man may be ſtabbed with a hundred fleſh-wounds, without being in danger.

Habicot, in his diſſertation upon the operation of bronchotomy, tells us, that he once had a young man brought to him, who had been ſtabbed by robbers with no leſs than twenty wounds in the breaſt, throat, limbs, and private parts, ſo that his firſt ſurgeons had left him for dead. Habicot carried him into his ſurgical ſchool, where he continued with his pupils, from ſeven at night till one in the morning, dreſſing all his wounds. One in the throat was ſo deſperate, that he was obliged to perform bronchotomy; and yet the young man was ſafe, and in three months was quite reſtored.

II. The ſecond general rule is, That, as far as it can be accompliſhed, it is your duty, in a penetrat-

ing wound with the ſword or bayonet, to bring it into a condition in which its ſides may adhere; that is, to cleanſe it of its blood, to cloſe the wound, (but not till it have ceaſed bleeding), to lay its ſides together with a tight bandage, and to cloſe its mouth with a ſlight compreſs.

The difference betwixt a gun-ſhot wound and that made by a bayonet or ſword will be beſt underſtood by attending to an individual caſe; a wound, for example, of the fore arm. If a ball paſs along the fore arm, entering at the wriſt and going out at the elbow, raking along the bones; in a bruiſed wound of ſuch a length, it is the rule, you know, to make no leſs than three inciſions, one at the entrance of the ball, one at the place where the ball goes out, and one ſomewhere in the courſe of the wound, theſe are neceſſary to prevent collections of matter; the wounds need to be kept thoroughly open, and ſtill the whole canal of the wound heals with difficulty, and we are never out of fear of arteries burſting out along with the eſchars, nor of new collections of matter; and very often the bones are ſo ſpoiled by collections of matter that the fore arm is loſt: this is the nature of a gun-ſhot wound. But ſuppoſe a young man, in fighting a duel with the ſword, to be wounded in the ſword-arm: His antagoniſt's weapon goes in at the wriſt and out at the elbow; if in ſuch caſe any great artery be wounded, then indeed it injects the arm with its blood, forming a proper aneuriſm, ſo that we are forced to cut up the fore arm, and tie the wounded artery: but if it be merely a fleſh-wound, it is no

doubt ſomewhat dangerous from being deep and penetrating; but ſtill it is ſo little different from a common and open wound, that could we bring the ſides of this tube-like wound fairly into contact with each other, it would cloſe in a day, juſt as the lips of a common wound adhere in a day; and the reaſon that it it does not happen ſo is plainly this, that the blood which exudes from the very ſmalleſt arteries is ſufficient to fill the tube of the wound: it not only fills it, but the bleeding going on within ſide, while it is prevented by a compreſs and a cloſe bandage from getting out, the tube of the wound is not only filled, but dilated with blood: and, therefore, you are ſenſible, cannot adhere. It does not adhere, juſt for the ſame reaſon (as I have obſerved) the healing of an ill-amputated ſtump, is delayed where the arteries not being fairly tied, have bled after the dreſſing ſo as to fill the baſin of the ſtump, and ſeparate the flaps from each other, and not only prevent adheſion and bring on ſuppuration, but produce (from the grumous blood) a gangrenous ſtump filled with foul and ſtinking matter, partly purulent, partly conſiſting of blood.

Perhaps you will ſay, Why ſhould we not, in a deep wound, ſuck out this blood, and then tie up the wound cloſe? Now this is the very point; and what we ſhould ſuppoſe beforehand would be uſeful, has really been done with great ſucceſs. You need not be told, that there are many romantic ſtories of friends having ſucked the wounded among the ancient warriors, and having reſtored them to health. Perhaps you may

not know, that this operation of ſucking wounds is ſo much uſed in eaſtern countries as to have become a regular profeſſion. Nay, in a country not ſo far off, in France, it was the cuſtom to cure wounds by ſuction, inſomuch that there alſo it became a trade. Certain people in a regiment, for example, or in a village, were famous for their ſkill in ſucking wounds, performing wonders, and confounding the regular ſurgeons, and obliging them at the ſame time to confeſs the efficacy of this treatment; ſo that when two ſoldiers went out to decide a quarrel with the ſword, they carried a ſucker with them, who in caſes of fleſh-wounds, and frequently alſo in ſeverer wounds, performed his function with ſuch wonderful effect, that very commonly the ſoldier was able to walk home and do his duty, and the affair was entirely concealed.

Were this thing merely curious I ſhould drop it here: but it is a fact both ſo little known, and ſo uſeful and well authenticated, that I muſt explain it to you: for although it may not be a rule nor practice for your imitation, yet at leaſt it explains and eſtabliſhes a principle, the knowledge of which may be of real uſe, viz. That blood extravaſated within the cavity of a wound prevents adheſion, while the ſucking out of the blood rendered the cure quick and eaſy.

This kind of cure was called the *ſecret dreſſing*, either becauſe the young men who were wounded in duels were by it enabled to conceal their wounds, or rather, perhaps, becauſe being performed with ſome ceremonies which were diſagreeable to the prieſts, they refuſed abſolution or extreme unction to thoſe who had

ſubmitted themſelves to the ſecret dreſſing; and for that cauſe alſo it was concealed.

The ſuckers, to keep their profeſſion to themſelves, pretended to make it a magical ceremony; they muttered words through their teeth, made ſome ſtrange motions, and then drew the ſign of the croſs. It was from this profanation that there aroſe a hot war betwixt them and the prieſts: the prieſts refuſed extreme unction or any ſacrament, to thoſe who had undergone theſe magical or diabolical ceremonies; while the ſuckers, on the other hand, refuſed to ſuck thoſe who ſhould have any commerce with the prieſts, pretending that the Chriſtian rites of the ſacrament or extreme unction interfered with their incantations: though, after all, this ſucking buſineſs was very ſimple, very uſeful, and ſo entirely natural in its effects, that they can be very eaſily explained.

The ſucker was preſent at every duel; the rencounter ended the inſtant that one of the combatants received a wound; the ſucker immediately applied himſelf to ſuck the wound, and continued ſucking and diſcharging the blood till the wound ceaſed to bleed, and then the wound being clean, he applied a piece of chewed paper upon the mouth of the wound, tied up the limb with a tight bandage, and the patient walked home.

They ſucked till the blood ceaſed to flow; none was left in the wound to prevent the ſides of it adhering: Their function thus emptied the veſſels, cleanſed the wound, brought the blood towards the wounded part, produced, like the application of a cupping glaſs, a

gentle and eaſy ſwelling, which brought the ſides of this tube-like wound ſo fairly together as to make them adhere; they healed as if by a charm, while in truth their healing ſo, was a moſt natural conſequence of this pleaſant treatment. But however promiſing this may appear in theory, it is ſtill neceſſary that it ſhould be proved by experience to have been really ſucceſsful; and no authority can ſpeak more convincingly to this point than the caſes which La Motte has recorded, who was himſelf an eye-witneſs of many wonderful cures, "ſuch as are incredible," ſays La Motte, "to thoſe to whom I relate them; and yet I need not be ſurpriſed at this incredulity, ſince they are cures which I could not have believed myſelf, unleſs I had actually ſeen the thing done." In ſhort, La Motte had ſeen the wounds of ſwords paſſing quite acroſs the breaſt or belly, had ſeen the ſcars of theſe wounds, and had the faithful teſtimony of theſe ſecret combatants; but he would believe nothing, unleſs he were allowed to put his finger into the wound.

I never doubted, ſays La Motte, that this ſecret dreſſing might cure a fleſh-wound of the arm, for example; but that the ſuckers ſhould cure in this way a thruſt through the breaſt or belly, ſeemed very ſtrange; till one day I was called to attend a young fellow, a common ſoldier, who had been run through the breaſt with a fair lounge, in at the pap and out at the ſhoulder. After having examined the wound, and noticed the length of his antagoniſt's ſword, being well ſatisfied that the weapon had pierced the lungs, and gone quite acroſs the breaſt; I ſaw the drummer of the regiment,

(who was the ſucker on this occaſion), do his buſineſs; he firſt ſucked one wound, then, turning his patient over, he ſucked next the opoſite wound; he then applied a piece of chewed paper upon each, and next day the ſoldier was ſeen walking in the ſtreets.

After this La Motte ſaw a man of better condition ſucked with the ſame ſucceſs. He was the Brigadier of a horſe-regiment, who had been wounded quite acroſs the lungs, but without any material harm to the lungs, or great veſſels. Thus, ſays La Motte, is this way of ſucking wonderfully ſucceſsful; and would always, I am perſuaded, be ſo, did the ſuckers but limit themſelves to the right caſes of ſimple wounds of the limbs, or even of the breaſt; but they ſuck indiſcriminately every wound, and wherever there is extravaſated blood, as in the thorax, oppreſſing the lungs, they muſt be unſucceſsful.

Wounds therefore of the ſword or bayonet, in the arm or thigh, may be cured by ſuction, and by putting their ſides in cloſe contact; and whether this be an old practice, or an odd one, unlike the buſineſs of a regular ſurgeon, is not the queſtion; but if it be uſeful, that is the main point; and it is here proved that it is uſeful, not only in fleſh wounds of the limbs, but in wounds acroſs the cavities, where there is no great veſſel, nor any of the viſcera wounded, and where there is no extravaſation of blood.

However proper ſetons and tents may be in gun-ſhot wounds, where there is a loſs of ſubſtance, a ſloughing wound, and of neceſſity a tedious cure, they muſt not be uſed in a clean wound, made ſimply by the thruſt of a ſword, or by the ſtab of a bayonet or knife; but

on the contrary, if the ſurgeon be called early, he may apply his long compreſſes, with a tight bandage inſtantly; for that will both prevent bleeding, and enſure a ſpeedy adheſion; but, if he be not preſent, he muſt try to get out the blood by waſhing and ſoftening the wound, and then put it ſo together with his compreſs and bandage, as to give it a chance of adhering. Our old ſurgeon Wiſeman was much offended with the practice of a Spaniſh ſurgeon, who, when one of the Engliſh ſailors was wounded with a rapier in the arm, ſtitched up the mouth of the wound cloſely. "This caſe, ſays he, I inſert, to ſhow you, that ſuch wounds ought not to be ſtitched, but dreſſed up with ASTRINGENTS, COMPRESS, and BANDAGE; for ſo thoſe wounds, in a good habit of body, with compreſs and bandage, do frequently agglutinate in a few days*."

Nor is even a clean wound of the abdomen, made by a ſabre, difficult to heal. It is a doctrine, to be ſure, that wherever the bowels are expoſed to the air, the air will excite inflammation, and the patient muſt die. This is the doctrine indeed; but doctrine, when oppoſed to practice, is of very little value. Indeed, the abſurdity of this doctrine is manifeſt; for daily, in ſtrangulated hernia, we open the bag of the hernia, inſpect the condition of the bowels, handle them, and turn them round, (expoſed thus to worſe injuries than the air), and then we thruſt them back into the belly, with no little force, and yet all is well. What then would become of this ſo common operation for her-

* Wiſeman, Vol. II. p. 82.

nia, if the bowels were always to inflame, or even if commonly they were to inflame upon being expoſed to the air?

Thus in ſabre wounds, if but the bowels are ſafe, if no turn of inteſtine be wounded, though the bowels deſcend through the wound in the moſt ſhocking manner, ſo as to be ſupported by the hands, ſtill if they be put back, as in the operation of hernia, the patient may be ſafe; he will not indeed always eſcape, but he will ſometimes: and one caſe of this kind will do much in eſtabliſhing our confidence in the powers of nature.

La Motte once, when a perſon was wounded in the ſide, cut off a large piece of omentum, put back the protruded inteſtine, and the patient did well.

Mr. Roſiere, a French ſurgeon in Lower Normandy, put back the inteſtines into the belly of a peaſant's boy who had been gored by a bull. The boy came the next day on foot three miles from his village, carrying in the ſkirts of his ſhirt, and in his hands, a great bundle of the inteſtines which had protruded again; they were put again back, the wound was neatly ſewed, and the boy being kept quiet for ſome time, made a very perfect recovery.

But there is recorded a third inſtance of this, ſtill more ſurpriſing, of a ſoldier who was wounded in the ſide with a halbert. He walked a full mile with his inteſtines protruding from the belly. He alſo had wrapt them in the ſkirts of his ſhirt, and carried them (not in his hands, but) in his hat. The weather, it being Mid-ſummer, was intenſely hot, and the roads duſty;

and it was reported to the author who relates the ſtory, that the inteſtines were as dry as parchment, and blackened with duſt. He was brought to a charitable old lady, who having bathed the inteſtines in warm milk, replaced them, and ſtitched the wound with the needle; and this ſoldier alſo was perfectly cured.

But there is another caſe, ſtill more wonderful, related by Dr. Cochrane, of a negro, who, reſolving to take away his own life, ſtabbed himſelf in the belly in a ſhocking manner, ſo that his bowels hung down from the wound. He refuſed all aſſiſtance, always tore open the wounds; and the negro-driver, with a brutality exceeding all that we have ever been told of the ſhocking puniſhments and very miſerable condition of that unhappy people, ſwore that he was a worthleſs fellow, and then turned the key upon him, leaving the poor wretch weltering in his blood, and lying naked on the floor of his very miſerable hovel. Next day the ſurgeon found him alive; but it is no wonder that a fellow-creature, feeling himſelf a man, and ſeeing himſelf thus neglected and abuſed, reſolved to rid himſelf of exiſtence. He ſtill refuſed all help. He lived in this condition, ſtill neglected, till at laſt he was able to crawl out of his hovel. He was ſeen going to town carrying the protruded bowels in the coarſe blanket which was wrapped about him. He was ſeen by Dr. Cochrane with the protruded bowels all inflamed and granulating, ſhooting out new fleſh, and covering themſelves with a kind of ſkin. He ſauntered about the plantation, ſwam often in the ſea, lived this idle and irreglar life, but nothing interrupted his cure,

which was ſoon perfect. The tumor of the inteſtines was like a woman's breaſt, and he became ſtrong in the end, and fit for labour*.

After recoveries from ſuch protuſion of the bowels, and ſuch deſperate wounds, nothing can ſeem wonderful: indeed it is not with the deſire of raiſing your wonder, but with the deſign of eſtabliſhing your confidence in the powers of nature, that I cloſe my account of ſabre wounds with the notes of theſe very ſingular caſes.

I ſhall proceed to ſum up the concluſions ariſing from the facts and reaſonings which I have put before you. You will foreſee a ſet of rules very different from thoſe belonging to gun-ſhot wounds; for you perceive, that fleſh wounds with the bayonet, or ſword, or ſabre, are leſs dangerous than gun-ſhot wounds. Theſe require no ſcarifications, no openings, no ſetons paſſed through them; there is no painful ſearching for foreign bodies, nor any ſlow exfoliation of bones; there is neither any danger from too high an inflammation, nor any great riſk of gangrene. If they could be but freed of blood, and their ſides cloſely applied, there might be an almoſt immediate cure. The practice then is extremely ſimple, and may be tolerably repreſented by theſe rules:

1ſt, If there be a ſimple wound raiſing a flap of ſkin, perhaps touching the ſcull, or even reaching the brain,

* The author adds an analogy well ſuiting the climate in which all this happened: "Often the mules being gored by the cattle, the owners, having ſecured them, reduce the inteſtines, and ſtitch them up, without any bad conſequences."

it may be put down to adhere; and if there be no danger below, if there be no extravaſation of blood by which the brain might be oppreſſed, or the adheſion of the flap prevented, it will adhere; and of courſe, we have this comfortable aſſurance, that if all be ſound and ſafe, the flap will adhere; but if there be extravaſated blood, ſplinters of bone, or any cauſe of danger, it will not adhere; and this laying down of the flap is an eaſy attempt, and never can be productive of any harm.

2*d*, Where there is a clean ſabre cut in any of the limbs, if there be no great artery wounded, even though the weapon ſhould have penetrated or cut acroſs a bone, it will heal; it is only intervening blood that can prevent its adheſion, or ſome fault of the conſtitution, ſome infection in the hoſpital, or ſome camp diſeaſe. Wherever we expect to heal ſuch a wound, we are careful to waſh away all clots of blood, to allow the bleeding veſſels time to exhauſt themſelves and to ſtop; and then, inſtead of wrapping ſuch a limb in relaxing poultices, we clean the wound, put the edges neatly together, ſtitch it perhaps, cover it with an adheſive plaſter, dreſs it dry with lint, and never apply any poultice, unleſs it ſhould be required on account of pain and ſwelling, and that will only be on the third or fourth day.

3*d*, If there be a deep and penetrating wound, we try to bring it to the ſame condition with a clean open wound, to purge it of its blood, and ſo cauſe its ſides to adhere; and the ſucceſſes of the ſecret dreſſing, ſo much practiſed in France, ſhould not at leaſt

be deſpiſed as a hint, if it be not indeed a direct leſſon for the imitation of the ſurgeon. And however we do in this reſpect, yet there is this eſtabliſhed difference betwixt a gun-ſhot wound, and the ſtab of a bayonet, that we make no inciſion, unleſs there be ſome bleeding artery which it is neceſſary to command; we make no openings in the middle, of even the longeſt ſword wounds; and as for ſetons, their uſe is doubtful, even in the caſe of gun-ſhot wounds, where there is a ſort of tube lined with callous parts, which are to fall into gangrene, and to come out in the form of ſloughs; but in a clean wound they would excite inflammation in a moſt dangerous degree. Setons, then, are never to be uſed in wounds with the ſword, unleſs they have become abſolutely callous, and continue for months in the condition of fiſtulas without any tendency to heal. But the uſe of ſetons in fiſtulous ſores, or of occaſional inciſions, when abſceſſes form, muſt, with many leſſer diſtinctions and rules of practice, be left to the diſcretion of the ſurgeon.

4th, If I have related ſome caſes of recovery from wounds paſſing quite acroſs the breaſt, and of others where the bowels had been expoſed, it was ſurely not to repreſent what will commonly happen, nor merely as things to be gazed upon as curious, but not inſtructive; you may draw this uſeful leſſon from them, that even in the moſt hopeleſs caſe we muſt not deſpair, and that our cares for our patient's ſafety ſhould ceaſe only with his life. And having ſpoken ſo much of wonders which nature will perform, it is the more

incumbent on me to ſhow you how dangerous wounds of the great cavities are, even when the danger appears trifling; for if but the point of the bayonet or ſword enter into the abdomen, full-hardly can that patient eſcape: His condition is much like that of a man ſtruck with the ſtiletto, (in the countries where that barbarous kind of murder is ſo often committed), where the weapon is long and ſlender, and the aſſaſſin, ſtriking from his dark corner, draws back the ſtiletto by its thong, and the wounded man neither ſees the hand that ſtruck him, nor, though wounded, can he ſee the wound; he is carried into the hoſpital; the wound is ſo ſmall, that it is hardly diſtinguiſhed even by the ſurgeon; and there the patient lies to take his fate, not ſenſible of half his danger, till on the ſecond or third day that pain begins of which he is ſoon to die in inexpreſſible torments, without a poſſibility of relief.

The laſt obſervation, therefore, is, that though ſometimes the moſt dreadful open wounds of the great cavities have been cured, yet the ſmalleſt penetrating wound, touching the bowels, is commonly fatal; that the wound of the bayonet is of this kind; that inflammation of all the bowels is the cauſe of the dreadful torments in which they die, often delirious with pain; that bleeding, profuſe bleeding, frequently repeated, is the only chance you can give your patient of eſcaping this terrible death.

I have ſaid, that the practice in ſabre-wounds may be tolerably repreſented in theſe rules; intending, by this limited expreſſion, to put you in mind, that this

cannot be conſidered as a perfect ſyſtem of rules, and that much is ſtill left to the direction and conduct of the ſurgeon; for if much were not ſtill left to the diſcretion and good conduct of the ſurgeon, where would be that ſuperiority of knowledge and judgment which we are all ſtriving to attain?

DISCOURSE VIII.

ON THE MEDICAL TREATMENT OF DANGEROUS WOUNDS.

However worthy of your attention thoſe rules of practice may be, which I have been hitherto employed in teaching you, yet there are many things which it is more important for you to be acquainted with than the mere ſurgery of dilating wounds, or extracting balls. Thouſands periſh by diſeaſes, while a very few die by the ſword; and the fate of the wounded depends much upon their being kept free from thoſe diſeaſes which follow an army, like the vultures that hover over its courſe. The medical treatment then muſt be more important than the mere ſurgery of gun-ſhot wounds; and I ſhall endeavour to explain to you how to conduct your patient through theſe dangers; by bleeding, while in danger of inflammation; by rich diet and wine, while undergoing a long and weakening ſuppuration; and by bark, when gangrene is likely to come on: And I ſhall explain to you, as well as I am able, all that hurts or heals his wound, and all that endangers his gene-

ral conſtitution, or keeps it ſafe; for indeed upon theſe matters, more than upon the immediate wound itſelf, depends the patient's ſafety.

In a ſubject like this, there muſt, no doubt, be ſome great and leading idea, which, being ſeized and unfolded, would make every ſubordinate idea eaſy and intelligible, and render the whole line of conduct very direct and plain; but I am ſure that this general idea cannot be made good to you without a knowledge of the whole ſubject, of which I muſt not ſuppoſe you are poſſeſſed. I am ſure it will be right to depart from my uſual plan, and, inſtead of a general and diffuſe explanation, followed by cloſer rules, lay down the general rules firſt, and then proceed to deduce from the practice itſelf thoſe principles, without which the ſubject cannot be fully underſtood.

I. When your wounded patient is firſt brought to you, he is in great confuſion; there is a tremor, a tonic ſtiffneſs, or almoſt a convulſion of the whole frame; there is a coldneſs, fainting, and nervous affection; but it is merely a nervous affection, and you ſhould treat it as ſuch. You may expect it to ſubſide in time, and therefore ſhould give ſome warm cordial and large opiates to quiet the commotion; this is no time for bleeding, whatever the nature of the wound may be. If the ſtupor continue, you ſhould give cordial draughts, and wine.

II. If this nervous commotion being quieted, a ſharp fever ſhould come on, ſtill do not bleed, but rather be upon the reſerve; for perhaps this, which at firſt ſeems to be a pure inflammatory fever, may turn out to be

a fit of an ague, to which the patient is ſubject; it may be a low and malignant fever; it may be an attack of ſome camp diſeaſe; and if a diarrhœa, great weakneſs, and low muttering delirium, ſhould come on immediately after you had bled your patient freely, you would be diſtreſſed at the thoughts of what you had done, and you would, indeed, have much to anſwer for.

III. Reſerve your bleedings for thoſe more dangerous caſes, where high inflammation is ſo often fatal, and do not bleed in wounds of the hips, ſhoulders, or limbs; reſerve bleeding for wounds of the breaſt, or belly, or great joints; for, in all wounds of cavities, inflammation, which can hardly be eſcaped, is the great danger.

IV. If a man be wounded after a full meal, there can be no doubt that a gentle vomiting muſt be uſeful, where it is allowed by the circumſtances of the wound. The old phyſicians found their advantage in it, and aſcribe the good effects of vomiting to the preventing of crude and ill concocted chyle from entering into the ſyſtem, ſo as to kindle up a fever. There is no doubt, that a meal, which was no load during health, will be a great oppreſſion upon a diſordered ſyſtem, and the carrying it off muſt be a great relief; although the old phyſicians, by talking this uſeleſs jargon about ill concocted chyle, might almoſt provoke us to reject both the doctrine and the practice. The ſyſtem cannot be weakened by a gentle emetic; and if the ſyſtem ſhould fall low after vomiting, it were eaſy to ſubſtitute a fitter ſupport and better excitement than

that of an oppreſſed ſtomach and loaded inteſtines, by firſt diſcharging theſe crude meals, and giving when the ſtomach were emptied, food of eaſy digeſtion, and cordials ſuited to the condition of the ſyſtem.

V. But in every wound there comes a period of weakneſs, in which we repent of every bleeding that we may have made, even when it was really needed; a period in which, by confinement and pain, occaſional fever, diarrhœa, profuſe ſuppuration, or colliquative ſweats, the patient falls ſo low, that it is not eaſy to ſupport him through the cure; and thus there are two great principles in the treatment of gun-ſhot wounds! That even at firſt we ſhould be ſparing of blood; and, that the period of weakneſs which is to ſucceed, is the greater danger; on this ſingle point hangs all the practice.

We are not entitled to bleed in a mere fleſh wound, becauſe every gun-ſhot wound is firſt to fall into a partial gangrene, then to give out a profuſe ſuppuration; and if there be no wound of a joint, nor fractured bone, the firſt inflammation never runs too high.

Since then there is no danger from the preſent inflammation of a fleſh wound, why ſhould we waſte that ſtrength with bleedings, which is ſoon to be ſo ſeverely tried by weary confinement, great gleetings, profuſe ſuppurations, and pain, and want of reſt? Here we are to expect from time to time new collections of matter, new paroxyſms of pain, new diſcharges of balls or pieces of cloth, and ſtill returning acceſſions of fever, which quite exhauſt the patient, till in the end perhaps he dies.

Bleeding is to be uſed only in the ſpring, when new recruits have come into the field, full of young blood, and inclined to every inflammatory diſeaſe; in ſpring alſo, even the veteran ſoldiers have lain in cities during winter, and are recruited from the fatigues of their laſt campaign, ſo that they even will bear bleeding; in ſpring alſo the peripneumony, rheumatiſms, and inflammatory diſeaſes of all kinds, prevail. With officers alſo, it is plain, that bleeding may be more freely uſed than with common ſoldiers, for the officers feel leſs of the hardſhips of a ſoldier's life; the officer is fed, and clothed, and lodged well, and too often indulges in wine, and lives luxurioufly, while his fellow-ſoldiers are ſuffering the ſeverity of the weather, and the want of clothing, with poor diet, unwholeſome drink, and all the other hardſhips of war. It is perhaps a proof of this that Mr. Ranby, in his book, gives no examples of ſucceſs from free bleedings but in young men of high rank, moſt likely becauſe thoſe young men were better able to bear this practice; but I fear too there is ſomething here of flattery to the great, a meanneſs from which the high abilities of Ranby ſhould have exempted him. He muſt have felt, when he ſpoke only of the wounds of princes, that a poor fellow in the ranks was as fair a ſubject for obſervation, and his wound as good an argument in a point of practice, as that of the Heir Apparent: If Ranby would ſhow himſelf thus fond of curing princes, he ſhould not have been aſhamed alſo to ſpeak of men.

I think it of more importance to repeat the cautions

againſt bleeding, than to direct you when to bleed. I ſay you muſt not bleed ſo freely in common ſoldiers; you muſt not bleed thoſe exhauſted with the fatigues of a long campaign; you muſt not bleed in autumn, when diſeaſes of weakneſs are frequent; you muſt not bleed in the midſt of camp-diſeaſes, when dyſenteries or fevers prevail; and in the foul air of hoſpitals, bleeding, how much ſoever it may ſeem required, ſhould be done with a very ſparing hand; to be bleeding can hardly be neceſſary in a mere fleſh wound.

It remains then for me to mark out for you the preciſe caſes in which bleeding may be freely uſed.

You muſt bleed freely in all wounds of cavities, for there inflammation is the moſt immediate and preſſing danger. Your bleedings ſhould be for preventing the inflammation, for they will not cure it. If inflammation once come on fairly, you can hardly ſave.

If inflammation come upon the breaſt, the pulſe riſes, the patient breathes ſhort, with ſuch pain and oppreſſion, that he is at laſt ſuffocated, and dies. If the belly be allowed to inflame, he dies in torments which are called "miſerere mei," as not to be deſcribed. And as for the inflammation of a wounded joint, it is attended with ſuch violent fever and racking pain, that the patient dies; or if he paſſes through thoſe firſt dangers, it is only to die more ſlowly of the great diſcharges, while the eroded cartilages and thoroughly diſeaſed bones extinguiſh all hopes of a cure.

Now, if a patient will keep ſuch a limb, or if he be wounded in the belly, head, or breaſt, or perhaps with

two ſuch dangerous wounds, you muſt bleed him profuſely, I had almoſt ſaid, without bounds. But while I deliver this leſſon, I cannot but remember to qualify and limit this rule of bleeding, by ſhowing how much you may go beyond the mark.

The French ſurgeons are accuſtomed to bleeding, with a freedom which an Engliſh ſurgeon has no idea of, and can hardly excuſe; for they bleed twice, thrice, or even four times in twenty four hours, and continue it ſometimes to the fifteenth or twentieth day; and there is no doubt that ſometimes, by ſuch profuſe bleedings, they have ſaved thoſe who would have been loſt by a more timid practice. It is to this daring practice that I aſcribe their ſucceſs, ſometimes wonderful, and eſpecially ſo in wounds of the cavities or joints; but there are caſes which might be produced from the beſt French writers, which ſhould ſerve you rather as warnings than as examples; and I ſhall give you ſuch a caſe, from the practice of Mr. Ravaton, one of their moſt famous ſurgeons; a caſe which I mention the more willingly, becauſe Mr. Ravaton ſeems conſcious that he had gone too far, confeſſing freely, that his patient was ſaved rather by his own natural ſtrength, than by the ſurgeon's ſkill.

He was a young man belonging to a militia regiment, and was deſperately wounded in a duel, and the corps wiſhing to conceal the affair, entreated Mr. Ravaton to receive him privately into his houſe: The ſword had paſſed acroſs the breaſt, in above the pap, and out betwixt the fourth and fifth rib behind; he was brought to the ſurgeon's houſe more dead than

alive, inſenſible, without pulſe, continually putting up blood; there being emphyſema at each wound. Ravaton dilated both; the difficulty of breathing was ſuch that he could not ſpeak, but toſſed himſelf in the bed from ſide to ſide, ſix times in the minute, throwing about his legs and arms in great agony.

He was bled copiouſly five times in the ſpace of three hours: before the evening he was able to ſpeak; by eleven at night he was much relieved. So far every thing was well.

But here followed ſomething ſtill more daring. Mr. Ravaton ordered an apprentice to ſit with lights in his room, and inſtructed him, that if this diſtreſs continued he ſhould open the vein during the night. Mr. Ravaton, from his chamber, heard him crying out during all the night to be bled, and in the morning he found that the young man had drawn blood no leſs than nine times.

By this bleeding the patient had fallen into a ſtate of inſenſibility, in which he lay for two days; and when he recovered, he awoke as it were from a dream, neither remembering his having been wounded, nor having any conſciouſneſs for ſome time of his dangerous ſtate. He complained no longer of the difficulty of breathing; and, by giving him nouriſhing ſoups and broths, Ravaton recovered him from his dangerous weakneſs; the cough, fever, exceſſive ſweatings, gradually ſubſided, and on the twenty-ſecond day he left Mr. Ravaton's houſe, though quite pale, and woefully reduced.

Ravaton words this account ſo cunningly as not to

make any clear confeſſion of his own raſhneſs; but he gives a ſtrong hint, that, on the morning, he really feared that his apprentice had bled this young officer once too often *.

Such imprudences as theſe I am ſure you never will commit; for I know that it will be difficult for you to keep up your reſolution to that aſſurance and boldneſs in bleeding which is really needful. You will be too fearful, I am perſuaded, rather than too bold; and therefore I muſt conclude with obſerving that even this bleeding was not fatal, and that in wounds of the bowels and joints bleeding can hardly be too profuſe; but ſtill you muſt be careful, that while you dare to do every thing that is neceſſary for preſent ſafety, you riſk nothing which may produce future danger.

Thus you are to uſe bleeding boldly, but with diſcretion; you are to uſe it in the young and healthy, in wounds of the head, the breaſt, the belly, or of the great joints.

But this is not in the common courſe of things. Battles or ſieges ſeldom take place in the ſpring; the army is moving eaſily; few are ſick, and ſtill fewer wounded; the few that are ſlightly wounded are ſent to lie in the neareſt towns, and thoſe who are wounded in the great cavities generally die.

But your practice begins when all manœvering is over; and when, towards the end of the campaign there have been great battles and ſieges; when perhaps the army is retreating, while all around you is nothing

* Ravaton, p. 260.

but confuſion and diſtreſs. The wounded increaſe in number; they are crowded into hoſpitals, and hurried from place to place; they are exhauſted with the fatigues of the field, and their ſickly conſtitutions are now entirely worn down, with long ſuffering and pain. In ſhort, thouſands are in danger of low fever, while a very few only can need bleeding, or even be in danger of inflammation, unleſs indeed it be of that eryſipelatous or gangrenous kind which is ſo frequent in hoſpitals and camps.

The ſecond great principle, which I propoſed to you ſomewhat in the form of a theory, is therefore more reſpectable than a mere theory. It is not ſo much a general theory, it is rather a general fact, and written in characters ſo plain that he that runs may read; and it is well that you be inſtructed in this; for though the omiſſion of bleeding when required be a great fault, to bleed a man who is in danger of low fever, or labouring under a camp diſeaſe, were to looſen entirely the little hold he might have of life.

Perhaps it may not yet appear diſtinctly to you that there is any ſtrict connection betwixt the condition of the ſyſtem and the eaſy healing of wounds, becauſe you do not know that the fever which attends gunſhot wounds is generally of the low kind, and that every thing that depreſſes the ſyſtem, though but for a moment, changes the face of the wound.

The fever which attends an ill-conditioned gunſhot wound, is attended with great heat, thirſt, a foul tongue, a low, quick, unequal pulſe, and there is a low muttering delirium, or, as Ranby expreſſes it, the

head not quite clear; and bark, wine, and elixir of vitriol, are to be uſed.

And as for the wound itſelf, the worſt appearance of a gun-ſhot wound always proceeds from weakneſs, ariſing from ſome very direct and manifeſt cauſe: nor does the wound ever look thoroughly ill, till the patient is weakened by long confinement or imprudent evacuations, or, as often happens, from exceſs of the natural diſcharge.

Ranby remarks, that the ſtump ſhall promiſe all imaginable ſucceſs for eight or ten days, when, ſuddenly changing its complexion, it ſhall begin to gleet prodigiouſly, look pale, and flabby; "and this gleeting, or profuſe diſcharge, runs the patient out of the world in a little while." The cauſe of this change on an amputated ſtump, or of the ill condition of any gun-ſhot wound, is plainly weakneſs; for, if a patient be uſing the bark, or opium, or wine, if he be deprived of the ſupport of theſe medicines for a ſingle day, the ſores change; if he be ſeized with the fit of an old ague, or is attacked with dyſentery, fever, or any camp-diſeaſe, the appearance of the wound inſtantly changes; and, when at any time diarrhœa comes on, the wound is altered as ſuddenly as the complexion; and if the looſeneſs continue but a few days, the wounds go all wrong, for the patient, being weakened, becomes cold in his extremities, his viſage becomes ghaſtly and yellow, the ſtump looks flabby and pale, and the fleſh ſeparates from the bones, the bone projects, the relaxed veſſels ooze out a bloody ſerum, and the blood lying from

dreſſing to dreſſing, produces a putrid ſore, of which the patient dies.

If you are in a great hoſpital, you will perceive the ſtumps, the ſores, the gun-ſhot wounds, and the fractured limbs, all go wrong at once; any general cauſe of weakneſs, or fever, produces this change over the whole hoſpital, while any particular cauſe of weakneſs will produce it in any one individual caſe. The paroxyſm of an intermittent fever, the accident of a foul ſtomach, two days of diarrhœa, will not only change the complexion of a ſore, but will alter its nature in a degree not eaſily to be counteracted.

And in the largeſt hoſpital one foul ſore or gangrenous limb, one unlucky fever, or the crowds of wounded which a battle pours in upon them, makes a whole hoſpital exhibit everywhere the ſame diſmal ſcene.

The marks which diſtinguiſh this condition of the ſyſtem are ſo plain, and the appearance of an ill-conditioned and flabby wound deluged with matter, and ſometimes blackened with exuding blood, is ſo peculiar, that I hold this notice to be enough; only it will be right that I explain to you, before I deſcend to the particular rules of practice, how terrible the conſequences of ill air are, whether in hoſpitals or in a camp.

It is very well known, that in the autumnal months, in marſhy ſituations, in crowded hoſpitals, in beſieged cities, where the whole country is driven in upon the town, wounds will never heal. Parée ſays*, that

* P. 284.

in the ſiege of Rouen the air was ſo noxious that no wounds would heal; and the beſieged, finding that all their wounds became gangrenous, reported that the beſiegers had poiſoned their balls; the beſiegers alſo, ſeeing none but putrid ſores in the camp, believed that their wounds were poiſoned; and, both within and without the city, ſuch was the ſtate of the air, and ſo putrid were all wounds, that the ſurgeons could ſcarcely look upon the ſores, or endure the ſmell; and if they neglected them for a ſingle day, they found them full of worms.

The hiſtory of one great hoſpital, the Hotel Dieu of Paris, which has been, I fear, an evil rather than a bleſſing to that city, has always appeared to me very curious.

Parée, 200 years ago, complained that in the Hotel Dieu ſores would not heal, and no operations could be rightly performed. After him Diouis, 100 years ago, proteſts againſt performing operations in the Hotel Dieu; and adviſes, that an hoſpital ſhould be built in the environs of the city, for thoſe who, have fractured ſculls, required the operation of the trepan. And Mr. Deſſault, late ſurgeon of the Hotel Dieu, ſaid, that wherever he performed the operation of the trepan, his patients were ſure to die; by letting them alone they had ſome little chance of living. In his time, therefore, they tried to relieve compreſſion, or coma, by bleedings, poultices, or bliſters, but never ventured to perform the trepan.

The two great rules then which I have laid down for you are theſe: To bleed only in the ſpring, when men

are juſt come into the field full of young blood, luſty, and ſtrong, diſpoſed to inflammatory diſeaſes. But in the autumnal months, in marſhy ſituations, in crowded hoſpitals, or unhealthy camps, when the men having been exhauſted with a long campaign, or having ſtruggled through lingering wounds, you look only for weakneſs and fever, gleety ſtumps and foul ſores; inſtead of bleeding, you muſt truſt to air and cleanlineſs, and bark and wine.

This ſingle principle will, I hope, make the whole buſineſs very plain to you; for, indeed, if a young man, without ſome leading principle, enter upon theſe duties; if he go into the camp with only ſome looſer notions of bleeding in inflammation, or of bark when gangrene is to be feared; he will be little valued there: if he do not underſtand the connection betwixt the particular wound and the general health; if he do not know with a glance the conſtitution of a patient, or the true ſtate of his ſore; if he be not careful to retain ſome general principle, which, like a myſtic clue, may lead him through this labyrinth; he will ſee thouſands dying around him, without knowing the cauſe, like the fable of the Grecian camp, falling under the inviſible ſhafts of Apollo.

This general view will reduce your notions of practice into a ſimple and manageable ſyſtem, and let you know what you are doing. You muſt always keep your eye upon the conſtitution of your patient, for there are many things more important to his health and ſafety than dilating his wound, or extracting the ball.

I. If your patient be an officer, well fed, and warmly clothed, in full health, riding perhaps a pleaſant journey while his men are marching, and living luxurioufly while they are ſuffering the hardſhips of their way of life, he will bear bleeding well.

II. If a raw ſoldier be wounded, who has come from home but lately; who has lived in garriſon, and at his eaſe; who is full of young blood, and has what Sir John Pringle has called the conſtitution of ſpring; he alſo will bear bleeding.

III. You ſhould bleed very freely in wounds of the belly, head, or breaſt, or great joints; but there is no need of bleeding in a mere fleſh-wound, where inflammation never runs high; and you ſhould be ſparing of the patient's ſtrength in fractured limbs; for though there be inflammation at the firſt, it is to be ſucceeded by by long confinement, tedious exfoliations of the bones, and a profuſe diſcharge.

IV. If a patient have lain long with gleeting wounds, and a malignant ſore; if this ſore burſts out from time to time, and will not heal; it will, too often, be explained to you, by the general air of the hoſpital, or by the habit of the patient's body: but if there be no ſuch cauſe, you will then renew your ſearch for balls, or pieces of cloth, or ſplinters of bone.

V. But if you attend cloſely to the conſtitution of your patient, and the air in which he lives, you will find in the ſoldiers who have lain long in your hoſpitals every mark of weakneſs; you will find pale and flabby wounds, gleeting ſores, exfoliating bones, and ſtumps that will not heal: you will find, on the other

hand, as the cauſes of theſe, frequent fevers, hectic, diarrhœa, night-ſweats, profuſe evacuations from the wounds, which, as Ranby expreſſes it, "run the patient out of the world:" and in exigencies like theſe, you will find opium the beſt remedy for the dirrrhœa, wine and ſpirits of vitriol for the gleeting ſores, bark for the febrile paroxyſms, and air and cleanlineſs for the general health. Attributing much of their dangers and ſufferings to the tainted air, you will drive all loiterers from about your hoſpitals, and thoſe who are really ill you will try to ſend early home; and conſidering the duty and the feelings which preſs upon you at ſuch a time, you will riſk all patronage for yourſelf, to procure conveniencies for your ſoldiers; you will dare to offend, where it is neceſſary, in a right cauſe; you will ſpare neither ſolicitation nor remonſtrances; you will be ſteady and perſevering, but ſtill reſpectful to thoſe who are over you in command; reſpectful, not from any fear of your own intereſt, but from a manly ſenſe of ſubordination and ſervice, and a ſincere deſire of gaining your end, which is eaſily attained by a winning manner, but never by that conduct which is too apt to be felt as rude or mutinous by thoſe who are in command above you.

But, above all things, learn to refrain from after complaints; for at the end of a war they ſound too like the murmuring of thoſe who are diſappointed of the profits of it, and ill become the character which you ſhould endeavour to ſupport.

END OF VOLUME FIRST.

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DISCOURSES

ON THE

NATURE AND CURE

OF

WOUNDS.

IN TWO VOLUMES.

By JOHN BELL, Surgeon.

THE SECOND EDITION.

VOL. II.

OF PARTICULAR WOUNDS.

OF WOUNDS OF THE BREAST.
OF WOUNDS OF THE BELLY.
OF WOUNDS OF THE HEAD.
OF WOUNDS OF THE THROAT.
OF DANGEROUS WOUNDS OF THE LIMBS.
OF THE QUESTION OF AMPUTATION

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1800.

TO

EDMOND GOODWYNE, M. D.

THIS SECOND VOLUME OF DISCOURES ON WOUNDS,

IS PRESENTED BY THE AUTHOR,

AS A TESTIMONY OF RESPECT

AND AS A SLIGHT ACKNOWLEDGMENT

FOR THE

INSTRUCTION AND PLEASURE DERIVED FROM HIS

TREATISE ON RESPIRATION.

DISCOURSE I.

OF

WOUNDS OF THE BREAST.

HAVING paſſed through all the intricacies which belong to the general treatment of gun-ſhot wounds, we now advance to the more plain and eaſy doctrine of individual wounds: And in diſcourſing upon wounds of the thorax, it is natural, firſt of all, to reflect upon the very important parts which are contained there,—the heart, the lungs, the great veſſels, the thoracic duct: We cannot but wonder, that wounds of ſuch a cavity are not always mortal; but ſtill more muſt we be ſurpriſed at men eſcaping eaſily from the moſt deſperate wound of the lungs; ſurviving for many hours, or even days, where the weapon had abſolutely touched the heart itſelf. But wonder is ignorance, and as our knowledge advances wonder ſubſides; for in a ſubject like this, we compare the ſtructure of the parts with the conſequences of the wound, ſo as to arrive by ſlow ſteps at a knowledge of the true proportion betwixt the wound and

the dangers; and all that was wonderful at firſt, vaniſhes in the end.

We know that the cheſt contains the heart, the lungs, the great arteries and veins. We know that if the heart or great veſſels be wounded, there come on coldneſs, fainting, oppreſſion, a total ſinking of the pulſe, paleneſs, and death; that if the lungs be wounded, there is an emphyſema, or a breathing of air into the cellular ſubſtance, ſpitting of blood, difficult breathing, ſuffocation, and death; and if the patient outlive the danger, we expect pains in the cheſt, diſtreſs in breathing, dreadful cough, ſpittings of blood, reſtleſs nights and fearful dreams; and there will be, from time to time, hopes of recovery, followed by frequent relapſes, threatening death; and we are beſides, during all this ſuffering and pain, obliged to uſe bleedings, ſo profuſe as to be almoſt as dangerous as the wound itſelf.

If ſtill our patient eſcape theſe early dangers, there are others, ſlower in their progreſs, but perhaps not leſs to be feared. There come next, tedious ſuppurations of the cheſt, with diſcharges of broken ribs; then the wound ſwells, and the matter is confined; then a deluge of matter burſts out at laſt after long ſuppreſſion,—it burſts out with a temporary relief; but the diſcharge continues ſo profuſe, that weakneſs, fever, confirmed hectic, enſue, which hectic, unlike the true conſumption of the lungs, is ſometimes cured.

Sometimes alſo, it happens, that the outward wound heals when all is not ſound within: then matter form-

ing oppreſſes the lungs, and the patient labours ſo much in his breathing, that if the making an opening for that matter, either be not propoſed, or be not allowed, it collects in ſuch quantity, that the whole breaſt is diſordered and oppreſſed, and the patient dies.

Thus we have before us in one view all the dangers of wounded lungs; oppreſſion and ſuffocation at firſt; after that, high inflammation and pain; then long continued ſuppurations and waſtings of the lungs, ſo that a ſmall bud or tubercle only is left of them; and in the end, great oppreſſions from effuſions of matter or of blood. We feel that wounds of the lungs are moſt intereſting, from their dangers; from our ſeeing the cauſe of danger ſo plain and open; from our giving ſuch immediate relief, ſometimes by a bold uſe of the bleeding lancet, ſometimes directly by the immediate touch of the knife, to make way for the matter or blood.

I have already hinted at a thing really wonderful, that the thorax, containing the heart, lungs, and great veſſels, ſhould be ſo often wounded with ſo little danger. Many no doubt die, but numbers eſcape; for a wound of the ſubſtance of the lungs is far from being mortal. The blood may ſuffocate the patient; the fever and pain may waſte him; he may die of the inflammation or of the oppreſſion of the lungs; or there may be time for a large ſuppuration, or a lingering hectic to cut him off; but ſtill, if his wound be only in the edges of the lungs, he is in ſome degree

ſafe; he is only in danger when the thiek ſubſtance of the lungs is perforated, and falls into abſceſs, or when the root of the lungs is wounded, for there the large veſſels of the lungs being opened, the great effuſion of blood, like that from a wound of the heart itſelf, muſt kill, even by the quantity of blood loſt to the general ſyſtem; but beſides, this blood being thrown into the trachea, deluges the lungs, the patient ſpits up a frothy blood, blood inſtead of air occupies the lungs, ſo that he ſtruggles for breath but a few moments, and then expires.

But ſtill I return to the firſt part of this propoſition, to that whieh ought to be the moſt partieularly impreſſed upon you, that though no doubt many die, numbers do eſcape; they often recover from wounds of the bayonet or ſmall ſword; many recover alſo who have been ſhot fairly through the thorax, with fractures of the rib both before and behind, with many dangerous ſplinters of bone driven in upon the lungs; ſome of thoſe wounded with the ſmall ſword have hardly been ill, or have reeovered in a few days; and even thoſe wounded with balls acroſs the eheſt have reeovered in a month.

When the lungs are wounded, the diſtreſs and danger of your patient muſt ariſe either from emphyſema, —or from extravaſation of blood,—or from the ball, —or cloth or ſplinters of the ribs, either lying in the cavities of the thorax, or abſolutely ſticking in the lungs: But beſides theſe preſent dangers, there is a ſeeond train of dangerous ſymptoms, whieh you muſt

alſo learn to manage, eſpecially long continued ſuppuration in the breaſt,—callous ſores,—exfoliating bones,—or (the wound having actually cloſed) there may be collections of pus within the cheſt, and the operation of empyema may need to be performed. If I ſhould diſcuſs each of theſe points, I think that you would be bold and ſkilful in managing ſuch a caſe.

1. Of Blood poured out into the Cells of the Lungs.

When a man is ſhot through the lungs, if death be very near, it muſt be from ſuffocation; and you will find him with a bloody foam at his mouth; his face pale in the cheeks, and livid round the lips and eyes; heaving the breaſt with intolerable anguiſh; toſſing from ſide to ſide in bed; the bloody foam increaſing; the breathing becoming more difficult, and the blood and air rattling in the throat; then the pulſe flutters, and the extremities continually grow colder, till (ſtruggling, in ſomething like a convulſion) he expires.

If you find your patient ſpitting blood and breathing high, but not much oppreſſed, or his oppreſſion increaſing very ſlowly, you may hope to ſave him. If there be no great veſſel wounded in the lungs, ſo as to ſuffocate him at once, it is probable that the ſmaller veſſels which are opened by the wound, will gradually ceaſe to bleed; and after four or five days

of alarming cough, with bloody expectoration, that ſymptom will ceaſe; and in order that he may the ſooner be relieved from his danger, you muſt bleed very freely: let it be your intention to reduce him very low by quick bleedings; and let theſe bleedings have the effect of continued internal hemorrhagy, without the dangers of it: let them depreſs him to the ſame low condition to which the inward bleeding would moſt likely have brought him; and the ſyſtem being emptied in this direction, there will be leſs danger of immediate ſuffocation in the lungs, and but little fear of the ſucceeding inflammation riſing too high. It is only by theſe repeated bleedings that the patient can be ſaved: you muſt keep the vaſcular ſyſtem low in action, and ſo drain it as to prevent the lungs from being oppreſſed with blood.

One thing is very clear, that if you bleed only when the cough and bleeding from the lungs return, you never can do wrong; for this is the plain matter: The patient lying ſtruggling before you, is to loſe a given quantity of blood; if it be allowed to flow out into the lungs, he may be ſuffocated; if you draw it from the arm, this ſuffocation is prevented; if you keep him low enough by bleeding, there will be no blood to ſpare for this extravaſation into the lungs; if you bleed only when the bloody extravaſation returns, you are taking no blood away but that which you cannot ſave; and thus you ſee, that it is only the moſt profuſe bleeding that can keep your patient from ſuffocation; and *that* will be eſtabliſhed in your mind

as a rule of ſound practice, which ſeemed ſhocking and dangerous, when mentioned in explaining only the general nature of wounds; you will feel, by ſuch caſes, that the French ſurgeons (with all their partiality for bleeding), could hardly, in ſuch a caſe, go too far.

II. Of Blood poured out, not into the Cells of the Lungs, but into the Cavity of the Chest.

The next cauſe of ſuffocation, is blood thrown out into the cavity of the thorax, not into the cells of the lungs:—it is leſs dangerous and more eaſily relieved; and it may proceed from one of two kinds of wound, either from a fractured rib having torn the intercoſtal artery; or from blood coming, not thus from the walls of the thorax, but from the lungs, which often bleed out into the thorax, as well as upwards into the throat.

If the blood which oppreſſes the lungs come from the lungs, then it is attended with a foaming of blood at the mouth, and a continual cough; if it come from the intercoſtal artery only, then there is no coughing of blood, but an oppreſſion increaſing every hour. In either caſe the patient is in a melancholy condition; and indeed this oppreſſion from blood merely, gives him all the appearance of one who is wounded in ſome of the great veſſels, and ſoon to die. The patient, in a few minutes after he is wounded, begins

to be oppreſſed ; he cannot lie down ; he ſits in bed raiſed up with pillows ; he often ſtarts up in great agony, crying out that he is ſuffocating : he draws his breath with great contortions and writhings of the body, with anxiety and fear of inſtant ſuffocation, ſuch as cannot be deſcribed ; he draws his breath with contortions and great effort, and yet receives not half his quantity of air ; his voice begins to be obſtructed, his face becomes livid, his eyes turgid, his extremities cold, his pulſe oppreſſed, quick, and fluttering ; there is a rattling in his throat, and his forehead is bedewed with a clammy ſweat.

If the patient be not in the hands of a ſkilful ſurgeon, he will ſurely die. But when the ſurgeon thruſts in his finger to ſearch the wound, he feels hot blood ; it follows his finger ; even the getting out a little blood in this way is a relief, and the patient is fully relieved by a more regular emptying of the thorax : often, the ſurgeon ſeeing that blood follows the finger, and being ſenſible of the true cauſe of this oppreſſion, brings his patient over the ſide of the bed, as in tapping for the dropſy, makes him ſupport himſelf upon his hands, and hang with his head reclined ; by this dependent poſture the blood iſſues from the breaſt, and he is for the time relieved, breathes more calmly, returns to bed, lies quietly down, and continues in tolerable eaſe for twelve hours, till, perhaps, the blood flowing from the wounded artery, fills the cavity of the thorax ſlowly, and the breathing becomes again difficult in proportion as the breaſt fills : he is

again put into this diſtreſſing poſture, and again the thorax is emptied of its blood; and thus, from dreſſing to dreſſing, he is relieved and kept ſafe from ſuffocation, till at laſt this inward bleeding ceaſes, and allows the wound to cloſe.

It is not merely the laying the patient in this poſture, that will always relieve the breaſt; the blood flows with extreme difficulty; ſometimes coughing, or the patient's endeavours and ſtrainings help to empty the cheſt, the putting the finger into the wound always aſſiſts; the flowing of the blood is made extremely eaſy when a large canula is introduced into the wound; any tube that is moſt at hand will ſerve; on many occaſions, the ſurgeon has found even ſo ſmall a tube as the catheter of uſe. But why ſhould ſo harmleſs an operation as this be ſpared? Let a large canula be introduced into the wound, at every dreſſing, every twelve hours, oftener if the breathing be oftener oppreſſed, and repeated daily, till the blood, becoming gradually paler, ceaſes to flow. If a ball have paſſed through both ſides, the danger and oppreſſion will be very great; and both ſides of the thorax muſt be freed of blood. If the oppreſſion comes on inſtantly, there is danger leſt ſome great artery be wounded; if it come more ſlowly, but at laſt arrive at that degree which the patient can no longer bear, it is clear, from the ſlowneſs, that it is ſome ſmaller veſſel: If there be oppreſſion of the breaſt, without bloody expectoration, the bleeding is from the intercoſtal artery only, and there is no wound in the lungs.

Whatever may be the cauſe of this inward bleeding, theſe are your RULES: Firſt put in your finger; perhaps it may diſcover, or may evacuate the blood:— If the blood do not follow the finger, then ſome tube muſt be introduced, and the tube for ſo ſimple a buſineſs need not be a nice one: If you cannot get your tube into the thorax, and the breathing continue oppreſſed, you muſt enlarge the wound, and enlarge it freely; to be afraid of expoſing the lungs to air when they are already torn with a bullet, and loaded with blood, is mere childiſhneſs, and uſeleſs theory, very unlike the proper management of ſuch wounds. If you find the wound in the thorax too high, above the third or fourth rib; and if you find that no poſtures of the patient, however willing or able to turn himſelf, will bring the blood eaſily in that way; or, if you find the wound confuſed, oblique and difficult for you to dilate, you muſt do an operation which, as it is commonly practiſed for pus in the breaſt, is called the operation of EMPYEMA: that is, you muſt make a very free inciſion in the line betwixt two of the ribs, then puncture the pleura with a lancet, and introduce your tube there; or, in plain language, whenever you find that the natural wound will not empty the thorax, you muſt not fear to make a new wound, and you will make it in what is called the choſen point, the point of election, *i. e.* low betwixt the ſeventh and eighth rib, that there may be an eaſy drain. But whenever the wound is about the middle of the thorax, dilate it rather, which both changes the nature of the

wound and gets out the blood. When this blood proceeds from a wound of the intercoſtal artery, ſuch free inciſions are the more neceſſary; they allow us to ſee the artery, to feel the jet of its warm blood, by putting in the finger, and this allows us to preſs it with a compreſs, or to tie it with the needle and thread.

III. Of Emphysema or the Tumor formed by Air blown out from the Lungs into the common cellular Subſtance, or confined withiu the Thorax and oppreſſing the Lungs.

The emphyſema is very frequent after fractures of the ribs, and ſometimes follows common wounds. It ariſes from the air eſcaping, firſt, from the lungs into the thorax; then, from the thorax, through the wound of the pleura made by the fractured rib; then, from the cellular ſubſtance, which is over the rib, paſſing along till it inflates the cellular ſubſtance over the whole body. It is more frequent after a fractured rib, becauſe there is there a wide laceration of the lungs, and no exit for the air; it is leſs frequent in large wounds with a knife or broad ſword, becauſe there the air has an open and unimpeded iſſue; it is again more frequent in deep ſtabs with the bayonet or ſmall ſword; and it is peculiarly frequent in gun-ſhot wounds, becauſe the orifice in the ſkin inflames and ſwells, while the wound is wider within: We often find an equal degree of emphyſema at both wounds,

viz. that where the ball entered, and that by which the ball paſſed out, and we need to make ſcarifications at each wound, which we do the more willingly, becauſe ſuch ſcarifications empty the windy tumor of its air, and if neceſſary, they can be made ſuch as to empty the thorax of blood, or to give room for ſearching with the finger, and extracting the ſplintered bones.

This emphyſematous or windy tumor is one of the ſtrangeſt accidents that happens in wounds of the cheſt: It advances ſo quickly, ſwells the whole body, cloſes the eye-lids, puffs up the ſcrotum, and all the looſer parts, with ſuch alarming rapidity, and is attended with ſuch oppreſſion of the breathing, as to terrify the patient; and the ſurgeon himſelf, though he knows it to be a ſlight matter, compared with the apprehenſions of the ſufferer, is yet not entirely at eaſe. In ſhort, it is a ſymptom which is ſo particular, and in ſome circumſtances ſo dangerous, that it requires a very full explanation.

When a rib is broken, the point of the broken bone is preſſed down upon the ſurface of the lungs and touches them: It abrades and lacerates the ſurface by the continual motion of the thorax; and it is often from the ſlighteſt and moſt ſuperficial wound of this kind, that the emphyſematous tumor proceeds; for, in moſt caſes of emphyſema, the laceration of the lungs is ſo ſuperficial, that it is not even attended with the leaſt degree of bloody foam from the mouth, or any other ſymptom of a deep wound; and if the pa-

tient die, the wound cannot be ſeen even after diſſection, but is only to be found by inflating the lungs: Yet the ſurface of the lungs being touched, even in this ſlight way, the air eſcapes from them at every inſpiration; the air which is then within the cavity of the thorax, is of courſe compreſſed, ſo that at the next expiration, this compreſſion muſt force the air either back again into the lungs, or out by the wound in the walls of the thorax, and ſo in among the cellular ſubſtance which ſurrounds the broken rib. Thus in every inſpiration there is a ſuction of ſome air, which is drawn through the wounded lungs, the air expands into the cavity of the thorax, the lung which gave out that air ſubſides again, and lies almoſt entirely quieſcent, partly from the wound in it, which, like a rent in a bladder, prevents it being inflated, and partly from the oppreſſion of the air within that cavity, where there ſhould be a vacuum to cauſe its diſtention; ſo that in the firſt inſpiration, air is drawn in through the wounded lung, in the next inſpiration it is breathed out through the wound of the thorax: Every new inſpiration draws more air from the wounded lung, and every new expiration drives more air out into the cellular ſubſtance; there is no further outlet for the air, which makes its way forwards, undermining the common ſkin with wonderful rapidity; ſo that the emphyſematous crackling tumor appears, firſt, over the broken rib, or over the wounded point of the thorax; then extends over the whole cheſt, (oppreſſing the breathing); then over the neck and

face, filling particularly the eye-lids, ſo that the eyes are abſolutely cloſed; then over the belly; then down the thighs; the private parts are at laſt enormouſly ſwelled; and no part eſcapes this tumor, except the palms of the hands, and the ſoles of the feet:——more air is every moment drawn out from the wound of the lungs, and driven under the ſkin; the patient is every moment more and more oppreſſed; till at laſt the breathing is quite interrupted, the pulſe flags, the extremities grow cold, and the patient, if he be not relieved by ſome operation, muſt die.

The philoſophy of this diſeaſe, if I may be allowed to ſay ſo bold a thing, is quite miſunderſtood; and it happens very ſtrangely, that the moſt palpable blunders are to be found in the writings of thoſe who are looked up to as oracles on this point, and who boaſt of their diſcoveries, and claim them as their own, with an eagerneſs which would imply ſomething very important. But perhaps the eaſieſt form in which I can deliver this queſtion to you is, by explaining firſt in my own way the real condition of a wounded lung.

The moment that the lungs are wounded they fall down, and continue in this collapſed ſtate until the wound heals, which it does in the courſe of a very few days: but from the moment in which the lungs are wounded, the uſe of the wounded lobe is loſt, ſo that if the wound be in the right ſide of the lungs, the breathing is performed only by the left, only half the quantity of air is inſpired, and the breathing is

difficult: But, this collapſed ſtate of the lungs, which cannot be remedied, which muſt inevitably continue at leaſt for a few days, while it is a cauſe of diſtreſs, is at the ſame time a chief means of ſafety. When the lungs are unfolded, their veſſels have their full diameter, they hold their full proportion of blood, and if, after being wounded, the lungs could continue dilating at every reſpiration, their wounded veſſels would throw out much blood; but the moment that they are wounded, they fall down to the back bone, they continue in this collapſed ſtate, and can no more be filled than a torn bladder can be inflated; and moreover, they are oppreſſed by the thorax being filled within with blood or air, and this collapſed condition of the lungs prevents much loſs of blood: There is leſs blood thrown out into the cavity of the thorax to oppreſs the lungs, and there is alſo leſs thrown into the bronchiæ, which is ſtill a more dangerous kind of bleeding, ſince it threatens ſuffocation, not only by filling the wounded lung with blood, but by affecting both ſides of the lungs.

If the lungs, when wounded, were to continue in perpetual motion, I do not know how we ſhould expect a cure; for the air would be continually ſtreaming through the wound, and the wound itſelf, alternately dilating and contracting like that in an artery, could not heal. But as the wounded lung lies in a collapſed ſtate, the edges of the wound are in contact with each other: There is, as we find by diſſection, a ſlight effuſion of blood, a degree of livor, a ſwell-

ing, thickening and inflammation round the wound, and thus, in two days, the wound heals. It is healed partly by adhefion, partly by this thickening of the cellular fubftance round its edges; and thus the lung becomes once more entire, and its function is reftored.

The blaft of air from a wound in the thorax, is often fo ftrong, that at every breath it will extinguifh a candle, and rufhes with confiderable noife. This ftrong blaft of air, fo far from being a fign of wounded lungs, is often ftrongeft when the lungs are abfolutely entire; it is a fign of a free and open wound in the thorax, but by no means of wounded lungs; for whether the lung be or be not wounded, the air enters fo freely by the outward wound that there is no vacuum formed to give them play, and therefore they fall down and lie collapfed till the outward wound heal. The thorax therefore has nothing to do with the lungs, but is like a pair of bellows, having a large air-hole, which admits the air every time the breaft rifes; and when the breaft falls again, that fecond motion blows it out. The air is alternately drawn in, and thrown out at every refpiration, with a ftrong blaft; but whatever air iffues through the wound, had been drawn in by the wound, and had never paffed through the lungs: There is no vacuum to move the lungs. The lungs, whether they be entire or whether they be wounded, always lie collapfed.

That the lung of one fide which remains unhurt, is fufficient to fupport the fyftem, we learn from va-

rious accidents: From thoſe eaſes in which, either owing to the ineiſions made by the ſurgeon, or to the nature of the wound, the eheſt has lain quite open, and the lungs of one ſide quite collapſed, and where the patient has yet lived in tolerable eaſe in the mean while, and recovered perfectly in the end. We learn it alſo from eaſes of emphyſema, where the lungs are oppreſſed with air, and from eaſes of empyema or pus, within the cavity of the eheſt, obſtructing the expanſion of the lungs; and eſpecially we are ſure of it from the very gradual decay of thoſe who die with large ſuppurations within the eheſt, in whom we find, after death, that on one ſide there remains nothing but one ſmall knob or tuberele of the lungs *.

That the breathing ſhould be eaſier in a free and open wound of the eheſt than in a punctured wound, or that in the eaſe of a punctured wound, the patient ſhould be relieved by a free ineiſion, no one needs wonder; for, in a punctured wound, there is no way for the blood or air to eſcape from the thorax, while yet at every ſtroke of reſpiration more and more blood and air is drawn out from the lungs, till at laſt

* Sectione ſuſcepta, dextrum pectoris cavum invenimus pure oppletum tenui, virideſcente, materia copioſa alba, quaſi ſebacea, dorſum imprimis et diaphragma verſus mixto, quæ a pulmone ſuppurato producta videbatur. Pulmonis verò ne VESTIGIO quidem reperto, aſperam arteriam inveſtigantes illamque ad bronchiorum diviſionem perſequentes, in mediaſtinum hanc abire conſpiciebamus. KOELPEN, *de Empyemate obſervatio*, p. 135, 136.

the blood, and eſpecially the air, are ſo condenſed, that they not only oppreſs that ſide of the lungs, but by hindering the free play of the diaphragm, and loading the mediaſtinum, they oppreſs alſo the other lung, until at laſt the breathing, every moment more oppreſſed, falls lower and lower; the pulſe alſo ſinks in the ſame proportion; the extremities grow cold; cold ſweat bedews the forehead; and after great toſſing, and undeſcribable anxieties, the patient dies: But in a free and open wound, or when we make a free and open inciſion to relieve this diſtreſs, we relieve not the oppreſſed and wounded ſide, but the ſound ſide of the lungs, and all goes on tolerably well, till the inciſion heals, and the function of the wounded lung is reſtored.

If this reaſoning be juſt, then, inſtead of trying to get out the air, or hoping to reſtore the office of the lungs, we ſhould wiſh the lungs to lie in this collapſed ſtate; it is the beſt ſecurity againſt dangerous bleeding, their evolution is not abſolutely neceſſary for the patient's breathing, their continuing in this collapſed ſtate is the ſureſt means of healing the wounds in them. In ſhort, this collapſed ſtate of the lungs is one of thoſe happy accidents, inſeparable from the conſtitution of the part, which ſo obviouſly facilitates the cure, that we attribute it to a regular and fixed deſign of nature.

How impoſſible it muſt be to raiſe the wounded lung, and to renew its function, I think I ſhall now very eaſily explain, demonſtrating to you at the ſame

time, that thoſe who have intended this effect by their free inciſions, had not founded their diſcoveries as they have prematurely called them, on good principles; for Bromfield writes very ignorantly in that chapter, where he tries to reclaim the invention from Hewſon. Hewſon again is as vain of this trifle as if he were not rich in diſcoveries really honourable; and Mr Benjamin Bell, the moſt excuſable of all, follows them in the humble labour of gleaning and gathering up their miſtakes.

Firſt then, Mr Bromfield tells us, with great confidence in his own opinion, and great ſcorn of all others, "That the wound of the lungs being aſcertained, one would not imagine that any perſon, ſkilled in the true cauſe of the complaint, and in the danger, with a thorough knowledge of the parts, could be at a loſs for an attempt *to relieve;* for in caſe an opening is made between the ribs, and a canula introduced, whoſe diameter is larger than the wound of the lungs, the air will be forced out as faſt as it eſcapes from the lungs, therefore the lungs will have *room* for their *expanſion*, and the danger of ſuffocation will be removed; and when once the wound of the lungs is agglutinated, and the canula withdrawn, the external opening will be healed without any difficulty *." The notion of the thorax being exhauſted of air, before, according to the author's expreſſion, the wound of the lungs is agglutinated, is curious. The expreſſion, "the lungs having room

* Page 91.

for their expanſion," is ſtill more curious; but if any one ſhould doubt whether the author could intend to ſay ſo fooliſh a thing, as that the lungs, not being oppoſed, will dilate of their own accord, let him turn over to the next page, where he will find a remark, coupled with a fact, which is moſt curious, *viz.* "I remember a ſimilar happy effect, in accelerating the cure in a ſimilar caſe by the PATIENT'S PLAYING on the HAUTBOY, which, keeping the lungs forcibly diſtended for a long while together, kept the pleura cloſer to the ribs, ſo that the union of the ſeparated parts, (*viz.* of the pleura and ribs), was moſt likely ſooner effected than if he had truſted to the ordinary reſpirations."

The celebrated Mr Hewſon hardly reaſons more correctly than his competitor Mr Bromfield *, who ſo kindly permitted him to make himſelf known to the Society. "It is natural," ſays Mr Hewſon, "to ſuppoſe, that the wound of the pleura and intercoſtals may ſometimes be too ſmall to ſuffer the air to get readily out into the cellular membrane, and to inflate it, but may confine a part of it in the cavity of the thorax, ſo as to compreſs the lungs, PREVENT THEIR

* Mr Bromfield ſays very candidly, "Though I ſhould have been ſorry to have prevented Mr Hewſon's making himſelf known to the Society, by a remark which he thought new," *&c.*; but Mr Hewſon had many ways of making himſelf known to the Society, which Mr Bromfield had *nothing* to do with: He was among the number of thoſe who ſhared the merit of that moſt beautiful of all diſcoveries, the Lymphatic Syſtem.

EXPANSION, and cauſe the ſame ſymptoms of tightneſs of the cheſt, quick breathing, and ſenſe of ſuffocation which water does," p. 347. Through all his paper we find him, in ſpeaking of oppreſſion of the lungs, referring only to that ſide which is wounded. He never once mentions the oppreſſion of the diaphragm, or the preſſure on the mediaſtinum, nor does he in any ſhape hint to us the oppreſſion upon the lung which is ſound; and, in the paſſage which I have juſt quoted, he ſays, that "the air within the thorax prevents the expanſion of the lungs;" and, in directing how the inciſion is to be made, he adviſes, that it be ſmall, rather than large, "for penetrating wounds of the cheſt are inconvenient, on account of the air's entering by the aperture in ſuch *quantities* as to prevent the *expanſion* of the lungs." The tendency of all this is very plain; but it is only in the writings of Mr Benjamin Bell, that one can have a perfect abſtract of this opinion, which all of them had ſome faint notions of, but which he alone has obtained in perfection. He ſays *, "In the chapter above alluded to we have mentioned different methods of expelling the air *from* the *ſurface* of the *lungs*, but the ſimpleſt and eaſieſt is this: While the wound yet remains open, let the patient, in a ſlow gradual manner, make a full INSPIRATION, by which a conſiderable quantity of the collected air

* P. 207.

will be diſcharged *. This being done, the ſkin muſt be inſtantly drawn over the SORE, ſo as to cover it completely during EXPIRATION; and if the wound be moderately opened during INSPIRATION, the whole quantity will be ſoon expelled." This receipt for expelling air from the lungs, comes very naturally from the author, by whom we are told, in the chapter alluded to, " that when a violent exertion in coughing, crying or laughing has produced it, (*viz.* burſting of the lungs) the particular ſeat of the complaint will, in general, be pointed out by ſome degree of pain in the part where the rupture of the external coverings of the lungs *have* occurred."

Now, whatever intereſt this author may have in perſuading his reader that laughing is dangerous, and that the lungs may be burſt by immoderate laughing, I cannot forbear wiſhing, that he had ſatisfied us ſo far, as to have mentioned at leaſt one accident or fact of this kind.

* My reader, although he ſhould be the meareſt tyro in philoſophy, will know, that when a man inſpires with a wound of his thorax, if that wound be larger than the trachea belonging to that ſide of the lungs, though he may by INSPIRING draw air into the cheſt by the open wound, he can throw none out; in ſhort, inſpiration muſt always draw in air, both by the opening of the cheſt, and by the opening of the trachea, and expiration muſt blow it out if it will go. INSPIRATION and EXPIRATION are the ſame with regard to the opening of any wound, that they are with regard to the trachea: therefore Mr Bell has juſt repeated a boy's leſſon with a boy's fault in it, calling inſpiration expiration, and expiration inſpiration.

" The other means which we wiſh to propoſe (ſays Mr Bell) for drawing off air from the thorax, is Suction: An exhauſting ſyringe may be fitted with ſuch a mouth, of ivory or metal, as will allow it to be cloſely applied over the orifice in the pleura." And again he ſays, That " as much diſtreſs has, on ſome occaſions, enſued from both cavities of the cheſt being at the ſame time laid open, it ought never to be attempted." And the reaſon given for theſe inconveniencies, and the kind of danger that is apprehended, is not that the lungs of both ſides would collapſe, and breathing ceaſe, and the man die; but it is this, that the two cavities of the cheſt being laid open at once, and the air being admitted into both cavities at once, both cavities would inflame at once, and that would produce " MUCH DISTRESS." That it might produce much diſtreſs among his friends, I will readily allow; but as for the patient's own immediate diſtreſs, that, I believe, would be ſoon over and there would be little time for relieving him by ſucking up the air, with an elaſtic gum bottle, from " the ſurface of the lungs."

But the ſerious and plain concluſion is this, that the lungs will continue giving out air till they heal; that while they are giving out air, they muſt lie collapſed; that it is not deſirable that they ſhould be moved, for their lying unmoved is the beſt ſecurity againſt bleeding, and the ſureſt way of making the wound of the lungs heal: And ſtill further, we cannot, if we would, raiſe the wounded lung, nor renew its function; it is

rent ſo that it cannot be inflated; it is oppreſſed with air if the cheſt be cloſe, or if the cheſt be open, the air paſſes in ſo freely that no vacuum can be formed to move the lungs; and as for inſpiration emptying, and expiration filling the breaſt, it could never have been ſpoken of but by a perſon who could talk about the lungs being burſt with laughing. The inciſions which have been ſo much commended, are uſeful, not by raiſing the wounded lung, or renewing its functions; for that attempt is abſurd in all reſpects; it is needleſs, becauſe though a man does not live ſo eaſily, yet he does live, and does well with one lung only (I mean breathing only with the lungs of the one ſide) till his cure be completed: It is impoſſible to accompliſh it, becauſe the wounded lungs being ſtill open, the matter, air, or blood, iſſuing from that wound, fills the thorax, and prevents a vacuum: It is uſeleſs alſo; for it is, as I conceive, deſirable, that the lung ſhould lie collapſed and quiet till the wound in it heal; and, therefore, thoſe free inciſions, which I approve of as much as Mr Hewſon could do, are uſeful only where the breaſt is much oppreſſed with accumulated blood or air; and the inciſion which lets out that blood or air, alſo lays open the thorax, ſo as to let in the air freely, ſo that this free inciſion ſerves at once two good purpoſes; it makes the wounded lungs collapſe entirely, and ſets the lungs of the ſound ſide quite free, by relieving the diaphragm and mediaſtinum from the preſſure of extravaſated blood.

The practice then, in the caſe of emphyſema, ſhould be this: *1ſt*, Upon obſerving the crackling tumor beginning to form itſelf over a fractured rib, you ſhould make ſmall punctures with the point of a lancet, as in bleeding; and if the point be ſtruck deep enough, the air will ruſh out audibly. But, as this air was in the thorax before it came into the cellular ſubſtance, it is plain that the thorax is ſtill full, and that the lung of that ſide is already collapſed and uſeleſs, and muſt continue ſo: The purpoſe therefore of making theſe ſcarifications, and eſpecially of making them ſo near the fractured part is, not to relieve the lungs, but merely to prevent the air ſpreading wider beneath the ſkin.

2d, If before you arrive, the air ſhall have ſpread to very remote parts of the body, as to the ſcrotum, and down the thighs, it will be eaſier to make ſmall punctures in thoſe parts, to let out the air directly, than to preſs it along the whole body till you bring it up to the punctures which you may have made on the cheſt over the wounded part.

3dly, If, notwithſtanding your free punctures, and your preſſing out the air in this way, you ſhould find by the oppreſſion that either air or blood are accumulating within the cavity of the thorax, ſo as to oppreſs, not the wounded lung only, which was of courſe collapſed and uſeleſs from the firſt, but ſo as to oppreſs alſo the diaphragm, and through the diaphragm to affect the ſound lung; then a freer inciſion muſt be made through the ſkin and muſcles, and

a ſmall inciſion made delicately into the thorax, to let out the confined air or blood.

4*thly*, If it be a gun-ſhot wound, it will happen more frequently in that than in almoſt any other, that the wound of the lungs will heal very eaſily; for though there be at the firſt a bleeding from the wound, and an emphyſematous tumor, a bloody foam at the mouth, a rattling breath, and apparent danger of ſuffocation; yet theſe very alarming appearances ſoon change: For in a gun-ſhot wound there is, from the bluntneſs of the ball, a ſort of laceration, attended with an immediate ſwelling of the wound in the lungs; there is an effuſion of blood, or an ecchymoſis all round that wound; the wound of the lung ſwells and cloſes; the lung is capable in ſome degree of inflation; the riſing of the lung keeps the wound of the thorax and the internal wound of the lungs ſo in contact, that they ſoon adhere. This therefore is a buſineſs which we ſhould not meddle with nor interrupt: If emphyſema extend rapidly from both the bullet-holes, then we may find it requiſite to dilate them; or if there be broken ribs, we may chooſe to get the ſplinters away: But if there be but a ſimple wound, no broken rib, no emphyſema, little difficulty of breathing, and little ſpitting of blood, we ſhould ſimply lay a piece of ſcraped lint upon each wound, put a gentle roller round the body, bleed the patient, and lay him quiet: for it has often happened, that a man thus ſhot through the lungs, from being apparently in

the moſt imminent danger, has been reſtored in a fortnight to the moſt perfect health.

IV. Of Extracting the Splinters of Fractured Ribs, Pieces of Cloth, Balls, or other foreign Bodies.

Our moſt immediate duty is, to relieve the oppreſſion of the lungs, by getting out the air and the blood, and next to enlarge the wound, and take away the ſplinters of fractured bone.

If a ball have broken the rib, the pieces of the bone will be eaſily felt with the point of the finger; the inciſions ſhould therefore be made ſuch as to admit the finger eaſily, and to ſet all the ſplinters free; the ſplinters of bone may be picked away with the points of the fingers, or looſened with dreſſing forceps; the fingers ſhould be put in to feel the courſe of the ball, or the damage it may have done; and you ſhould not at the firſt dreſſing believe your work entirely done; more ſplinters may be ſticking even in the ſubſtance of the lungs, ſupporting the ſuppuration, and cauſing a very pungent pain, and (juſt as in a fractured ſcull) you ſhould be continually upon the watch to obſerve whether there yet remains any depreſſed bones injuring the lungs, and ſhould endeavour in your daily dreſſings to feel them and to pick them out *.

* The introducing the point of the little finger, or of the fore finger, according to the ſize of the wound, does not interfere in

Beſide the ſplinters of ribs, there are pieces of the clothes to be accounted for, as alſo the ball when it does not paſs through. If there be a piece of any of the clothes wanting, as of the waiſtcoat, and if there be a profuſe ſuppuration and increaſing pain, it proceeds moſt likely from that very piece of cloth having been carried in by the ball. In this caſe, we may put in the finger or a long probe to ſearch for it; but it is by no means likely that it will be ſeen till the flux of matter waſh it (after long danger and ſuffering) towards the wound. Yet we can in ſome degree imitate this operation of nature; for a mild injection of tepid milk and water, thrown through the thorax with a rapid ſtream, will at leaſt ſweep the thorax clean of grumous blood, and if practiſed frequently at the time of dreſſing, will (if aſſiſted by a proper poſture) bring any piece of cloth to preſent itſelf at the wound.

As for the ball itſelf, if it be loſt in the thorax, it is irrecoverably loſt; and no method that we can contrive will enable us either to find or to extract it: The matter cannot raiſe it towards the wound; it will fall downwards upon the diaphragm, and either ſettle itſelf, forming a ſac there, or cauſe a ſuppuration; and when an empyema is formed, the inciſion which lets the matter out will alſo allow the ball to drop.

any degree with our intention of cloſing the wound with a compreſs; for the finger ſhould always be introduced gently, and this way of probing ſhould never be repeated, unleſs when we are ſenſible of there being many ſplinters of bone.

V. Of Supporting the Patient under the Profuſe Suppurations.

The dangers of profuſe ſuppuration are next to be apprehended; for it very frequently happens, that after a wound, and inciſions like theſe, not only the dreſſings, but the very bed are drenched with matter, which, together with fever, cough, and violent pain, ſoon exhauſt the patient. The firſt danger of ſuffocation is now over; the bloody expectoration has ceaſed; the ſtrength is reduced to the very loweſt ebb, more, it ſhould ſeem, by our bleedings than by the wound; and we are bound by every motive to ſupport the patient through what remains of the cure. Now, as the cough is not to be appeaſed by bleeding, we give large opiates to quiet it, and to procure ſleep; we give bark, to keep up the ſuppuration kindly, and to make the wound heal; and we try to ſupport the patient's ſtrength by foods eaſy of digeſtion, and eſpecially by ſoups, jellies, and a diet of milk.

If it ſhould unfortunately happen, that the wound cloſes while all is not found within, the formation of matter will be foretold by ſhiverings; the actual formation of it will be proved (as in any other abſceſs), by the ceſſation of fever, and abatement of the pain; and, when it is fully formed, it will be felt by a weight upon the diaphragm, and anxious and difficult breathing; and theſe ſigns will increaſe with the quantity of the matter, till at laſt the matter can be felt by the patient himſelf, daſhing within as he moves:

The ſurgeon can diſcover it by tapping gently with his hand, and then alſo the patient will diſtinctly perceive, that he cannot ſleep but on the affected ſide. When all theſe ſigns appear, the operation of cutting the ſide ſhould be boldly done, it will give a temporary relief, delightful to the patient, after that kind of anxiety and ſuffering which is the moſt diſtreſſing of all to bear. Sometimes, no doubt, in this caſe we can accompliſh a cure, but too often the patient, exhauſted with the evening hectic and profuſe flow of matter, ſoon dies: he waſtes away as in a conſumption, and a few weeks cloſe the ſcene.

Thus have I conſidered the ſeveral points of practice, ſhewing you how to prevent ſuffocation, and to ſtop the bleedings in the lungs by profuſe bleeding from the arm; how to get out extravaſated blood, which lies oppreſſing the lungs, by enlarging the old inciſions, or making new ones, and introducing a tube; and how, by tying the intercoſtal artery, to ſtop that ſource of blood; how to diſpel the air of the general emphyſema by ſlighter punctures, and when to make freer inciſions in order to relieve the lungs. I have taught you how to pick away fractured bones; get out pieces of cloth; how to diſtinguiſh ſuppuration, and to perform the operation of empyema, and how to ſupport your patient under the vaſt diſcharge.

But I have been accuſtomed to add to this kind of general leſſon a particular repreſentation, as if of an individual patient lying wounded, ſuffering the agonies,

and ſtruggling through the dangers, of his wound, and happily in the preſent inſtance this manner of ſumming up the whole ſubject, makes a very ſhort and ſimple tale, not uninſtructive.

Suppoſe, then, that you are brought to a man, who, being ſhot through the breaſt, is ſtruggling for breath, and likely to die—you know that the great danger is from blood thrown into the cells of the lungs—you ſee him in danger of this ſuffocation; you know it by his high breathing, and by the bloody foam which iſſues continually from his mouth; you know that the only chance of reſtraining the blood is by bleeding in the arm, and you bleed him freely upon the ſpot. Then, in the courſe of a few hours, the emphyſema appears, which blows up the wound, extending along the breaſt, and increaſing in ſize with a rapidity which aſtoniſhes and alarms the patient—you then ſcarify, or rather puncture the wound, and preſs out the air; but if the lungs become every moment more and more oppreſſed, you dilate the wound, ſo as to lay the cheſt in a manner open, leaving ſo free an exit for the air, that the emphyſema cannot form again, nor the lung be again oppreſſed. This free inciſion admits your finger; you feel for ſplinters of bone, and pick them away; if the intercoſtal artery bleed, you ſecure it; if there be blood filling the thorax, which has come perhaps from the lungs, you get it out by changing the poſture of the patient, or by the help of a tube, and then you lay a piece of oiled lint within the lips of the wound; apply a large poul-

tice over all, and ſo compoſe your patient to reſt. At the next time of viſiting, you find him again labouring in his breathing; he has had a pungent pain in his breaſt, which indicates ſome ſplinter of bone ſtill pricking the pleura or lungs, and ſo at every dreſſing you let out blood, and when warned by pain, you always feel with your finger for ſplinters of bone: On the firſt day pure blood is diſcharged, and it runs freely: On the ſecond day ſtill there is emptied from the thorax perhaps a pound of warm blood mixed with clots: On the third day the blood is ſerous; and on the fourth, fifth, and ſixth days, the bloody tinge diſappears; pure ſerum ſucceeds to it, and pus again ſucceeds to the ſerum, till there is eſtabliſhed at laſt a regular purulent diſcharge.

From the 5th day the patient grows eaſier; from the 5th to the 10th day, the bloody expectoration gradually decreaſes, till at laſt it ceaſes altogether; from the 10th to the 20th day, the diſcharge from the breaſt decreaſes ſlowly, ceaſes at laſt, and allows the wound to cloſe. But many interruptions will often croſs you; the ſuppuration often flows in a continued ſtream, and waſtes the patient; the fever often riſes unexpectedly, with difficult breathing, oppreſſed lungs, and a profuſe diſcharge: Sometimes you will find this accounted for by the irregularities of the patient; but if ſuch ſymptoms return from time to time, or if there be a profuſe diſcharge, without any obvious cauſe, you muſt renew your ſearch for foreign bodies with all poſſible diligence; you ſee that the

ball has gone fairly through; you think that the ſplinters of ribs which you have drawn away, fully account for the ſize of the hole which you feel; ſtill, perhaps, you may be fortunate enough to diſcover one remaining ſplinter, which, however ſmall, may have been the cauſe of all this diſtreſs, or by waſhing out the thorax with milk and water, from time to time, (which you need not fear to do, when you know it to be full of grumous blood, or acrid pus,) you may get away a piece perhaps of the waiſtcoat, upon which the wound will quickly heal. Thus, by care and prudence, and a continual attention to the ſymptoms, and to the wound, you will have the happineſs of bringing your patient ſafe through all his dangers and ſufferings; thus the ways of nature and good ſenſe are ſo plain and eaſy, that nothing but a ſtrange deſire of wandering into whimſical and artificial practices can carry one aſide from ſo direct a line.

But that you may have warnings as well as examples, (and warnings are often of greater value than the beſt examples), I ſhall next preſent you, not with this fictitious repreſentation of an eaſy cure, but the real hiſtory of a caſe which I boldly hold up to you as an inſtance of the very worſt practice. I ſay boldly, becauſe I am venturing to criticiſe the practice of one of the firſt ſurgeons in France,—a practice acknowledged by the Academy of Surgery, and ſo, by implication, approved by all the ſurgeons of France.—I do not ſingle out this caſe through mere wantonneſs, but becauſe I think it really dangerous;—and when I ſhall have compared the bad practice, or what I think

the bad practice, with the good, your judgment will be ſettled in one important point, ſo that you ſhall not need to pin your faith upon the authority of any author, or number of authors.—You will then ſee clearly, and may chooſe whether you will abandon yourſelf to what I will call a preſumptuous interference, or rather hold to the ſimple ways of nature;—whether you will keep the wound open by main force of ſetons or tents, or allow it to heal, if it will heal, expecting it to continue open naturally, if there ſhould be any cauſe why it ſhould not heal;—for although the wound ſhould cloſe upon ſome piece of cloth or ſplinter of bone,—ſuch foreign body will produce matter, the matter will oppreſs the lungs, the oppreſſion will require the operation for empyema; and that opening will allow at once the matter, and the piece of cloth, to eſcape.

An officer was brought to Mr. Guerin wounded by a ball, which had broken the 5th rib twice, entering before and coming out behind. Upon putting his fingers into each of the wounds, Mr. Guerin felt many ſplinters of bone. He dilated both with free inciſions, and took away many ſplinters of bone. The patient coughed up much blood,—his extremities were cold,—his pulſe ſuppreſſed,—and there was ſuch fear of ſuffocation, that Mr. Guerin could hardly be blamed for having ordered three bleedings during the night; bleedings were repeated the next day, and the cough and bloody expectoration being abated by the 4th day, it was plain that the patient was ſaved for the time, and that he had a chance of life. But here is the ſin-

gularity of the management of the caſe; Mr. Guerin, after dilating the wounds, introduced a ſeton, which, of courſe, went as fairly acroſs the breaſt as a bow-ſtring croſſes a bow, and this ſeton he continued to draw with a perſeverance which is truly wonderful, from the firſt day to the 38th day of the wound; during all which time the patient's ſufferings were dreadful. "From the fifth to the fifteenth day (ſays Mr. Guerin), I drew the cord regularly; for fifteen days the ſymptoms were not diminiſhed, and in theſe fifteen days I was obliged to bleed no leſs than twenty-ſix times." From the fifteenth to the twentieth, his patient was a little relieved; from the twentieth he grew worſe, on account of a ſudden movement of the army, being hurried onward to the city of Gand; from the twentieth to the thirtieth day he grew greatly worſe; by the thirtieth day Mr. Guerin had completed the number of twenty-nine bleedings, having bled his patient, by computation, every day, with the intermiſſion of one day only. On the thirtieth day the attendant ſurgeon found himſelf obliged to bleed once more; and the ſymptoms growing much worſe, conſultations were called, and about the thirty-ſecond day the ſeton was removed; on the thirty-third day the patient complained of a pricking pain, and they were ſure ſomething muſt be wrong; they could not feel the ſplinter of bone, but reſolved, after mature deliberation, to cut up the ſide; and accordingly, an inciſion being made, which joined the two wounds, and was ſeven inches long, and the whole thorax being now laid open, they ſaw betwixt two of the ribs the

courſe of the ball along the lungs, and the groove which it had made in them. They found a piece of bone ſticking in the ſubſtance of the lungs, and having picked it out, this dreadful wound healed kindly, and the patient was ſaved.

From this caſe ſeveral reflections will ariſe, and you are already, I hope, ſo far ſurgeons, as to perceive that ſome ſteps of Mr. Guerin were bold and good, and what is ſtill more, were very ſucceſsful; but that the main ſtroke of his ſurgery here, viz. the ſeton, was very wrong.

You will notice alſo, in this caſe, 1ſt, How freely you ought to dilate every wound, more freely if there be fractured bones, and that all the ſplinters cannot be removed at once. 2dly, You will remark how uſeful the five bleedings in twenty-four hours were, towards ſaving this patient from ſuffocation; they were indeed the immediate means of preſerving his life. 3dly, You will find in this caſe a ſtrong proof of what I affirmed, that (after all that has been ſaid on this ſubject) there is no great danger in expoſing any cavity to the air. 4thly, You muſt remark, that where there is any very preſſing danger, you ought to venture every thing, and that the bold inciſion of Mr. Guerin, which laid the thorax ſo freely open, did ſave his patient's life.

But, on the other ſide of the account, ſtands every thing that relates to this fooliſh ſeton; for, had Mr. Guerin been aſked what good it was to do, it would have been difficult for him to have invented even a plauſible apology for a practice, which, if it was not doing good,

could not fail to do harm. Was this ſeton neceſſary for keeping the wound open? No, ſurely; for the wound could not have cloſed while it was irritated and kept in ſuppuration by ſplinters of bone, and a piece of cloth within the breaſt. Was it to draw the piece of cloth out? Surely, in the courſe of twenty days, a piece of cloth would have had ſome chance at leaſt of being floated towards the wound, either by the natural flux of the matter, or by the help of a mild injection. Was it uſeful in ſupporting the diſcharge? This would have been a ſore queſtion for Mr. Guerin; for it ſupported the ſuppuration only by inflaming the cheſt; and where inflammation of the cheſt, or high cough, or bloody expectoration, or a profuſe diſcharge, were the chief dangers, a great ſeton could hardly be a comfortable inmate in the breaſt. I think one might very boldly promiſe to produce bloody expectoration and terrible cough, profuſe ſuppurations and oppreſſion, to any degree, by drawing ſuch a cord acroſs a ſound thorax.

And it would be a ſorer queſtion ſtill to aſk, why did this gentleman never feel this pricking piece of bone till the thirty-eighth day; did it ſtrike or dart into his lungs only on that particular day? I fear the reaſon of his not feeling it before, is but too plain; the pain of drawing this harſh ſeton acroſs the cheſt was ſuch, that it deadened every leſſer pain, and he could not feel the trifling pricking of a bone till his greater ſufferings from the cord were allayed.

In ſhort, Mr. Guerin paſſes a great ſtrap of coarſe linen acroſs the cavity of the cheſt, and when it cauſes

high inflammation, he thinks to ſubdue it by bleeding;—when Mr. Guerin continued for thirty days drawing a coarſe ſeton through the breaſt every morning, and bleeding for the cough every night; what did he do, but raiſe inflammation with his left hand, to ſhow how well he could ſubdue it with the right? With this warning, which I am ſure you will underſtand in its true meaning, I ſhall conclude my obſervations upon wounds of the cheſt. But in leaving this ſubject, I cannot refrain from repreſenting to you, how cloſe the connection is between good practice, and the knowledge of parts. To an ignorant man all is wonderful,—to a well inſtructed man every thing is plain and eaſy; nothing paſſing within the patient, but what he calculates,—foreſees,—prevents,—knowing both the dangers, and the ſafety of the caſe. If the patient ſpits blood, he fears a wound of the lungs; —if there be an emphyſema, he is ſure of it;—if his patient be oppreſſed, he fears leſt there be blood within the cheſt; and when he puts in his finger, he is ſure of it, and relieves it;—if there be ſharp pains, he thinks ſome pieces of bone are ſticking in the ſide; and by ſearching for theſe alſo he gives relief;—if there be a violent cough, he apprehends inflammation; —if cough continue with riſing pain, he is ſure that inflammation is begun; if, with cough and pain increaſing, the patient is daily more oppreſſed, he is ſure the inflammation is then running dangerouſly high, and that his bleedings cannot keep it down;—if the patient be attacked with ſhiverings, he foreſees matter;—if evening hectic come on, his ſuſpicions are

confirmed;—if the breathing grows daily more oppreſſed, he is ſure of matter;—when the patient reſts only on the left ſide, he is ſure that the left ſide is full of pus; and having traced by ſymptoms only up to this ſtage, he ſtrikes gently upon the thorax, and hears the matter daſhing within;—and thus, through all the ſtages of this particular wound, the man of real knowledge ſees clearly every thing that is going on within.

DISCOURSE II.

ON WOUNDS OF THE BREAST.

You would obſerve, at our laſt meeting, that I had begun to repreſent to you the abſurdity of paſſing ſetons acroſs the thorax. You will, perhaps, remember my late promiſe of explaining this matter more fully; and I would not diſappoint you of any explanation, that might be either intereſting or amuſing to you; but, more eſpecially, if ſuch explanation concerned any great queſtion, or could give you more determined notions, and a freer reliance upon your own judgment, in the affairs of practice; and I am perſuaded, that this will really be the effect of laying before you a ſhort hiſtory of ſetons and tents.

Formerly, in ſpeaking of ſetons, I obſerved, that for medicines to be introduced upon ſetons, one could conceive many which might be hurtful, but none that could be uſeful; and, as for promoting the pus and ſhaking the bones, they would ſurely promote pus, juſt as ſplinters or balls would do; and they would ſhake many bones which ſhould not have been looſened.

Yet theſe are the beſt reaſons that the French ſurgeons have been able to aſſign; and theſe have been aſſigned only, becauſe they had ſtill a hankering after a practice, which had been handed down to them by their fathers, but which they felt, needed this kind of ſupport.

When we come to ſearch into this buſineſs, we find the hiſtory of it to be plainly this: that as Guy de Chauliac, Parée, and all the older ſurgeons, did not know how to dilate gun-ſhot wounds, they found theſe ſame ſetons uſeful in bringing the eſchar ſooner away, and in preſerving an open wound; and as they believed the wounds to be poiſoned, they took the opportunity of conducting, by theſe ſetons, whatever acrid medicines might, according to the prevailing doctrines of that time, have any chance of correcting the poiſon. This, as far as it regards the old ſurgeons, is a full and true account of the whole matter, and is in no ſhape deſerving of farther notice; but the doings of the modern ſurgeons, eſpecially of the French, deſerves ſome farther attention.

It is curious to ſee them attempting to vindicate by reaſon, a practice founded on ſuch prejudices as theſe; —it is very ſurpriſing to obſerve the cruelty and perſeverance with which they uſed to draw theſe cords through the wounded limbs; and when the roughneſs of ſuch a cord, or the acrimony of the drugs conveyed by it, produced a large ſuppuration (however painful), they were delighted with ſuch proofs of their ſucceſs.

We find the French ſurgeons paſſing their ſetons acroſs the thickeſt parts of the limbs,—running them

up along the whole length of the fore-arm, and often, at the ſame time, paſſing them through the wriſt joint, —loading them withal with acrid medicines;—no wonder then, that profuſe ſuppurations and dreadful ſwellings came on;—but ſtill they continued theſe cruelties, till the wound healed almoſt in ſpite of the pain, or till the coming on of very dreadful pain, great ſuppurations, and ſometimes of convulſions, forced them to deſiſt from this piece of ſurgery, and to draw out their ſetons, or ſometimes to cut off the limb.

The French eſpecially, artificial in their practice, have been addicted to this uſe of ſetons: and have, from ſtep to ſtep, become ſo familiar with them, that they have not confined the uſe of them merely to fleſh wounds, but have paſſed them, as I lately explained to you, quite acroſs the thorax,—acroſs the belly,—and through the great joints, as the knee;—and, in wounds of the head, have ſupplied their place with long and ſlender tents.

When we want to fill up the ſac of a hydrocele, or indeed to fill up the ſac of any other tumor, what do we contrive, but either to lay it open with a large inciſion, or to run a ſeton through it?—to fill it with ſome acrid injection, or to cram it with a large tent? While the animal machine continues the ſame, the ſame ſtimuli will produce the ſame effects, and a ſeton injection, or long tent, if they produce pain and inflammation in the ſcrotum, will not be eaſy in the cheſt; and unleſs we can uſe them in the cheſt, with the ſame intentions for which we uſe them in the hydrocele, unleſs it were our deſign to inflame the cheſt,

and to cauſe an adheſion of all the parts, we cannot uſe them with any conſiſtency or good ſenſe.

This ſimple reaſoning againſt ſetons, is ſo concluſive, as to be a perfect refutation of the arguments uſed in their ſupport; and, as for the matter of fact and experience, I have lately, in criticiſing the caſe given by Mr. Guerin, given you a pretty ſpecimen of their practice, ſuch as will ſet your conſcience quite at eaſe, although you ſhould be careleſs enough to omit the ſeton:—and I have ſelected this caſe, not becauſe it was the moſt fooliſh of many fooliſh doings of this kind;—there are many pieces of ſurgery recorded as wonderful as this;—but becauſe it ſtands very prominent among the College Memoirs, and is made an authority on this point.

To ſay that ſuch patients recovered by their ſetons, is, in my opinion, no more than to ſay, they recovered in ſpite of their ſetons. It is like what happened to a ſurgeon, who was dabbling in the thorax with a piece of cauſtic, which fell directly into the cavity of the cheſt, where it cauſed very large ſuppurations, and yet the patient was ſaved.—The patient recovered in ſpite of the cauſtic, juſt as Mr. Guerin's patient, and many other poor unhappy ſouls, have lived in ſpite of the ſetons. One would think, that people took a pleaſure in paſſing ſetons acroſs the eyeball, the cheſt, the knee joint, &c. merely to make fools ſtare, when the buſineſs might be as effectually done with an abſceſs lancet*.

* If any one ſhould wiſh to ſee the opinions of moderate authors, let him turn up the fifth volume of the Syſtem of Surgery, written

While I am thus reprobating the uſe of ſetons, ſurely that of the tents ſhould not eſcape. I know of no occaſion in all ſurgery, in which tents can be uſeful, except in the ſingle one of a narrow opening, which we deſire to dilate, in order to get at the bottom of the wound; and where either, on account of ſome great artery, or the fearful temper of our patient, we dare not uſe the knife; there a ſponge-tent will force open the wound. A tent for keeping an old ulcer open, is a downright abſurdity, ſince ſuch an ulcer will not cloſe; but, to fill a freſh wound with hard round tents, is juſt as bad ſurgery, and as unnatural, as the paſſing of a ſeton acroſs the wound.

The tents alſo of the French ſurgeons were often as careleſsly managed, as they were imprudently uſed: —Very frequently, tents uſed in wounds of the belly were loſt, occaſioned dangerous ſuppurations, and were in the end diſcharged with great pain and danger, at the diſtance of many months, or even years; and not unfrequently, tents, drawn in by the backſucking of the lungs, have got into the thorax, lain there unſuſpected, have occaſioned long ſuppurations, and even death*. Nay, ſtill more, tents, which had been uſed in dreſſing wounds of the thorax, have made their way into the ſubſtance of the lungs, and ſo been coughed up. Hildanus tells of a man†, who, having been wounded in the breaſt with a ſword, had been

by Mr. Benjamin Bell, where "Tents are EMPLOYED, prepared of dried ſponge, gentian root, and other ARTICLES; which, by ſwelling with the moiſture of the ſores," &c. &c.

* Vid. Ravaton, p. 221. † Obſervatio xiv.

long dreſſed with tents, had eſcaped from hæmorrhages, difficult breathing, and the other dangers, and his wound at laſt healed up; but ſtill he continued ſpitting pus, till one day, three months after the wounds had cloſed, he coughed up two tents, which had been uſed without threads to them.

And Tulpius* tells of a Daniſh nobleman wounded in the German wars, who, after ſix months of pain and danger, coughed up two tents, with which a wound in his cheſt had been careleſsly dreſſed;—and Pigrai, a pupil of Paræus, tells of a ſoldier, who, three or four months after his apparent cure from a wound of the breaſt, ſpit up a large piece of his rib, of conſiderable thickneſs, and, if my notes are correct, of no leſs than three inches long.

But if there was alſo knavery in this way of uſing tents, that ſuſpicion ruins at once all authority of the older ſurgeons; and La Motte declares roundly, that there was almoſt as much of knavery as ignorance in this practice: "For I have obſerved (ſays La Motte), one of your old maſter ſurgeons, in place of curing a wound of the belly in a few days, perform long inciſions, cram thoſe inciſions with tents, and confine his patients for ſix months, making a pretty hundred crowns, and much reputation to himſelf, out of a very ſimple matter:" ſo that ignorance and folly begot this practice; and when it was grown up to ſtrength, knavery leagued with folly, and profited as occaſion ſerved.

One thing more I muſt ſay concerning this old

* Obſerv. xv.

piece of ſurgery, that they were not nice about the materials of which their ſetons or tents were made: for a ſeton they uſed in general a piece of good ſtout tape or garter; they often took a long ſtrip of linen, and named it a ſyndon; and as for their tents, they made them out of any thing that was large enough, ſtrong enough, and hard enough; and La Motte, who had been often witneſs to theſe operations, avers, that they would very willingly have taken the help of a hammer to faſten them in, if they could but have done ſuch a thing ſecretly or without ſhame; and here alſo they were quite delighted with ſeeing prodigious quantities of matter ſpouting out when they drew their ſpigot away.

Having ſettled this point, and confirmed you, I hope, in your abhorrence of any thing in practice ſo harſh and unlike the ſimple ways of nature, I will return to my ſubject of wounds of the breaſt; for as yet I have deſcribed merely the wounds of the lungs. I muſt alſo ſhow you what are to be the conſequences of wounds in the heart, or in the diaphragm, or on the outſide of the cheſt.

Wounds in the left ſide of the breaſt are more dangerous than wounds in the right, on account of the heart's being there; and a wound through the left ſide of the breaſt, followed by faintings, difficult breathing, coldneſs of the extremities, ſuppreſſion of the pulſe, with great anxieties and deadly fear, are very certain ſigns that the man is wounded in the heart, and is about to die; and there is ſufficient time for theſe ſigns to appear, for it is not always at the moment that the

patient dies. One man being wounded with a ſword, the point of it cut the coronary artery, which threw out its blood ſo ſlowly that it was two hours before the pericardium was filled with blood; and then, after great anxiety, the patient died. In another ſoldier, the apex of the heart was cut with the point of a very long and ſlender ſword; and this ſoldier lived twelve hours, during which time, as appeared after his death, the heart had, at every ſtroke, been loſing a ſmall quantity of blood, till it had, in twelve hours, entirely filled the cheſt, and then the patient was ſuffocated and died.

But indeed, there is ſo little to be done in ſuch a caſe, and the ſigns and the conſequences of ſuch a wound are ſo clear, that it were a waſte of time to ſpeak longer of wounds of the heart. Wounds of the diaphragm are alſo out of reach, and all that you can deſire is, to know what ſort of accidents have happened to the diaphragm; and whether, after a wound of that important muſcle, the patient will live or die. Though wounds of the diaphragm are not material in themſelves, yet the diaphragm can hardly be touched, but in mortal wounds, *i. e.* in wounds touching both cavities, *viz.* of the thorax and of the abdomen, where moſt frequently the ſtomach, lungs, pericardium, or heart, are either wounded or are ſoon inflamed, and ſo drawn into diſeaſe. But there are ſome very curious caſes, where the patient recovered from the preſent wound, and died not till ſome months or years after, by what I may call a thoracic hernia, the bowels paſſing upwards through the diaphragm into the breaſt.

Parée deſcribes his diſſection of a maſon's boy, who being wounded in the breaſt, died on the third day; and upon opening the body, at firſt ſight, he thought he obſerved a phenomenon which he could not eaſily believe; he thought the ſtomach wanting; he went onwards ſearching with particular care, until at laſt he found the ſtomach, not in the belly, but in the thorax, inflated with air; and he found that it had paſſed upwards, by the wound in the centre of the diaphragm, through a hole no bigger than to admit the thumb.

But there follows in Paræus, a much more ſingular caſe, and a very intereſting one: a M. d'Allon, in the ſuit of the M. de Biron, grand maſter of the artillery of France, was wounded before the city of Rochelle, by a ball, which, entering at the lower end of the ſternum, paſſed out again betwixt the fifth and ſixth ribs. This wound was, you perceive, of the moſt dangerous nature; for it paſſed cloſe over the ſtomach, which, had it been full, could not have eſcaped. The ball could not fail to wound the diaphragm,—it muſt alſo have paſſed through the lungs, and yet he was cured of his wound, but with an infirmity remaining, which could not be accounted for, till after his death, which happened in about nine months. He was to all appearance cured of his wound, and apparently out of all danger from any conſequence of it; but ever after it, he had a weakneſs of the ſtomach, with frequent colics, and never durſt make a hearty meal for fear of an attack. In the eighth month after his wound, he had a dreadful attack of this habitual colic, of which, notwithſtanding every exertion, he died; and

when his body was opened by the celebrated Guillmeau, there was found in the cavity of the thorax, a great turn of the inteſtine colon, much diſtended with wind in the proper condition of a hernia, and much ſtrangulated, you may ſuppoſe, ſince it occaſioned the patient's death. Indeed, the hole in the diaphragm was ſo ſmall that it ſcarcely permitted the point of the little finger to paſs.

Wounds of the ſternum ſhould not be paſſed over in abſolute ſilence, ſince theſe alſo may come under your care. I have formerly taught you, that when wounds and fractures of the ſternum cauſe inflammation, and are followed by a collection of pus, there is formed a cavity under the ſternum, which did not naturally exiſt; and however much the operation of trepanning, in this caſe, may be queſtioned in theory, the fact is, that you are ſometimes forced to trepan; and for this there needs no better authority than that which we have from Galen, in his ſeventh book (of Diſſections).

A ſervant of Marilus who had received a blow upon the breaſt-bone neglected it at firſt; but there appeared in four months after, a collection of matter upon the ſternum, which his ſurgeon for the time opened and healed; but it ſoon inflamed, again proceeded to abſceſs, was again opened,—but it not healing, a great conſultation was called (and Galen, among others): the breaſt-bone was entirely rotten, the beating of the heart was ſeen on the left ſide of the diſeaſed ſternum, which frightened the phyſicians from undertaking his cure; but Galen was contented to take this upon himſelf: he adventured to cut the whole of the cor-

rupted breaſt bone away; the bone adhering to the point of the heart-caſe or pericardium, that alſo was of courſe cut, and the heart expoſed quite bare. They deſpaired of curing ſuch a wound, and yet the patient was in the end perfectly reſtored. Here, then, we have upon that authority, which has been always reſpected, a caſe exceeding, in the miraculous, all that has ever been recorded by the patient Vander Wiel, or gathered by Shenkius, or any German commentator among them. A man with a ſlow ſuppuration, confined matter, a carious ſternum, and the heart abſolutely expoſed and bare.

The ſternum may be thus fairly undermined with matter, ſo that where thre is truly no natural cavity, a very deep one may be formed; of which we have a curious example recorded by La Motte, of a ſoldier, who, being wounded at the middle of the ſternum with the point of a ſword, felt no pain nor difficulty of breathing for ſome time, as if it had not reached the cavity of the cheſt. La Motte bled the man, and dreſſed his wound very ſimply; but at laſt the inflammation and oppreſſion did come on; and one day in lifting the dreſſing, a large glaſsful of good pus ſpouted out, and then probing, he found that his probe went down very deep into the breaſt; but the matter came gradually in leſs and leſs quantities, till at laſt it ceaſed, and the wound cloſed.

You perceive that I have carefully gone through all the poſſible wounds of the breaſt; for I have given you leſſons upon wounds of the lungs, wounds of the heart, wounds of the diaphragm, and wounds of the ſternum; but there is one thing I am much concerned

in obſerving to you, for it will regulate the prognoſtic that you are to make, and will alſo be a rule of ſome importance to you in the cure itſelf: it is that, in the firſt place, you are never to pronounce any wound mortal unleſs it be plainly a wound of the heart; for the recoveries which men make after the moſt deſperate wounds of the lungs, are truly ſurpriſing; and, next, you muſt be careful to diſtinguiſh wounds of the pectoral muſcle, ſhoulder, or ſcapula, from wounds of the breaſt; for, were you not warned of this ſingularity, you would be inclined to believe that a wound had paſſed directly acroſs the breaſt, when in fact the ball, or weapon, had only turned round the breaſt and done no harm.

I ſhall now, in concluſion of this ſubject, reduce all that is important into the form of aphoriſms or rules, ſhowing the ſeveral degrees of danger, and the ſeveral ways of giving relief. And there is no ſubject on which I more willingly beſtow this degree of labour; for this buſineſs of wounds of the breaſt is important; and it might, if I ſhould leave it without ſaying more, appear ſomewhat confuſed.

1ſt, If the patient lie oppreſſed, toſſing, inſenſible, —his face ghaſtly, and his extremities cold,—his condition is very doubtful; it looks much like a wound of ſome veſſel, near the root of the lungs; and if ſo, he is ſurely gone.

2dly, If the oppreſſion come on more ſlowly, the

pulſe only hurried and fluttering, and the extremities not ſo cold, there is reaſon to hope, that his wound is merely in the edges of the lungs; and, as it is at a diſtance from the great veins and arteries, he may eſcape.

3dly, If ſpitting of blood, and the emphyſema, or windy tumor come on, unqueſtionably he is wounded in the lungs; but that wound is not always fatal:—It either the blood do not flow in upon the lungs in great quantity, or if, by our profuſe bleedings, that bloody exudation into the lungs can be reſtrained, then he may be ſaved.

4thly, If, when there is much oppreſſion, we put our finger into the wound, let ſome blood out, and ſo give relief, we are ſure that the ſuffocation proceeds from blood extravaſated in the thorax; and that kind of ſuffocation we know to be leſs dangerous by far than that proceeding from blood poured into the proper cavity or cells of the lungs, *i. e.* into the air-cells, into which we draw the breath, and which, while they ſhould be filled with air, are choked with blood.

5thly, If a bullet paſs fairly through and through, the patient is ſafer: he is in great danger, if it ſtop, whether within the thorax, or in the lungs; for when it paſſes through, as ſoon as we have ſaved him, by bleedings, from the firſt dangers, he is ſaved: But while it remains within the cheſt, he is expoſed to tedious ſuppurations, incurable ſores, hectic, waſting, and death; and nothing ſo wearies the ſurgeon, or depreſſes the patient's hopes, as an unceaſing flow of matter, and a fiſtulous ſore; nor can any thing be

more diſtreſſing to the ſurgeon than the ſeeing a patient ſlipping through his hands (to uſe ſo vulgar a phraſe), more eſpecially if, during a lingering diſtreſs, he has thought it neceſſary to ſupport the friends with hopes and promiſes; for then it falls peculiarly hard on all concerned;—on the ſurgeon, who has ſuggeſted, or allowed ſuch hopes, as well as on thoſe who have permitted themſelves to be thus deceived.

I ſhall next, after what is commonly called the prognoſis, explain to you in another ſet of aphoriſms, how you ſhould conduct the cure.

1ſt, I think you will not eaſily forget, that ſword or bayonet-wounds, often need no dilatations; and that the ſecret dreſſing, as it was called, or ſucking the wounds, or in plain terms, the cure by adheſion, had been, in ſuch caſes, attended with wonderful ſucceſs.

2dly, You know that gun-ſhot wounds require dilatation more frequently, from the peculiar nature of the wound; and that ſuch inciſions muſt be particularly large, when you are ſenſible, that there are many ſplinters of the ribs to be extracted; that there are pieces of cloth driven in; or that there is much blood lying upon the diaphragm and lungs.

3dly, You will remember, that the firſt and great danger is that of ſuffocation, from blood poured inwards to the trachea, and into the cells of the lungs;—that it is your duty to keep the patient low, and to drain his ſyſtem ſo thoroughly of blood, that none ſhall paſs towards the lungs to ſuffocate him;—and that there may not be blood enough in the ſyſtem to ſerve as fuel for that inflammation, which, ſooner or

later, muſt come on, the exceſs of which is thus provided againſt, without any particular rule.

4thly, The next great danger is of blood within the thorax, oppreſſing the lungs. It may perhaps be gotten out, by laying the head and ſhoulders out of the bed, making the patient heave and ſtrain for its diſcharge; but theſe are rather the attempts of leſs regular or ſkilful ſurgeons, while a man of real ſkill boldly puts his finger into the wound, or introduces a tube, or makes a new wound, if the firſt be too high in the thorax; and he makes his wound ſo free as to have it in his power to tie the intercoſtal artery eaſily, if it be from it that this blood has come.

5thly, The emphyſema is the ſymptom the moſt alarming, and yet the leaſt dangerous of all; it advances ſo faſt, covers the cheſt ſo quickly, blows up, at laſt, the neck and face, and is, withal, ſo ſtrange a ſymptom, that the patient is terrified, but the ſurgeon cannot be alarmed;—he knows the ſymptom, and how trifling it is;—ſcarifies the wound, preſſes out the air, and makes the paſſage for the air ſo free, that it cannot collect again.

6thly, The ſurgeon, never free from anxiety during the cure, watches the breathing, the cough, the fever, and the condition of the wound; keeps an eye upon all theſe points at once; and when there is a pricking in the ſide,—when there is any aggravation of the cough,—when there is an increaſe of the diſcharge, inſtantly his fears are excited for his patient's ſafety;—he probes the wound, feels it with his finger.—waſhes the thorax with an injection,—is at infinite

pains to find any little piece of bone that may be touching the lungs,—and tries to hook out any piece of cloth with his probe, or to float it towards the wound, by a mild and warm injection.

7thly, Senſible, at every turn, how ſlight a matter will iritate the pleura and lungs, he will never allow himſelf to do ſo unnatural and cruel a thing, as to paſs a great cord acroſs the cheſt, which is thus eaſily irritated by the moſt trifling piece of bone, or rag of cloth; butmerely lays a bit of oiled caddis gently within the wound, with a large emollient poultice over all.

8thly, And he muſt learn to play the part of ſurgeon and phyſician at once; and very fit it is, that the man who is managing the wound, ſhould guide the ſyſtem. Let the ſurgeon then lay aſide all apprehenſions, and all theory about fevers, and commotions of the ſyſtem, to attend to the ſingle duty of managing the patient's ſtrength,—whom he muſt bleed, in the firſt inſtance, almoſt to death,—bleeding not according to his own prudence, but according to the exigencies of the caſe. He muſt repeat his bleedings, whenever bloody expectoration returns;—whatever lengths that threatens to go, he ſtill muſt go before it, and prevent ſuffocation, by draining the ſyſtem of blood.—He bleeds, then, in the firſt days, not according to his diſcretion, but according to the exigencies of the caſe, againſt his will, reckoning to pay dearly for the preſent bleedings in ſome future period of the cure; and when the time comes, in which the oppreſſion is forgotten, and the danger of ſuffocation,

and the bleedings from the lungs are over, he begins to ſupport his patient's ſtrength with opium and bark,—and nouriſhing diet and milk;—and then the ignorant friends begin to blame him for thoſe very bleedings which really ſaved the patient's life; then only he feels within himſelf the value of all his former care of his patient; "he is ſo ſtrong built up in honeſty, that peeviſh words paſs by him as the idle wind, which he regards not."

DISCOURSE III.

ON WOUNDS OF THE BELLY.

EVERY wound is a diſeaſe, and every diſeaſe varies according to the conſtitution of the parts affected, and according to the offices which the parts are deſtined to fulfil. In the abdomen, the principles which explain its diſeaſes, are extremely ſimple and plain: we find the chief cauſe of danger to be the tendency of the peritoneum to inflame; we find every wound apt to excite this inflammation, and every inflammation, however ſlight, apt to ſpread, to extend itſelf over all the viſcera, and terminate in gangrene and death. Upon theſe grounds, we cannot but pronounce a wound of the belly to be a mortal wound.

There are a thouſand occaſions on which this delicacy of the peritoneum may be obſerved; the wound of the ſmall ſword, and the ſtab of the ſtiletto, explain to us how quickly the peritoneum and all its contained bowels inflame by the moſt minute wound, although it be almoſt too ſmall to be viſible on the outſide, and ſcarcely within; for often upon diſſection no inteſtines are ſeen to be wounded, and no fæces have eſcaped

into the abdomen. In thoſe who die after lithotomy, we find the cavity of the peritoneum univerſally inflamed;—the operation of Cæſarian ſection is fatal, not from any loſs of blood, for there is little bleeding; nor from being expoſed to the air, for they alſo die in whom the womb burſts, and where the air is not allowed to enter; but merely from that inflammation which ſucceeds to wounds of the peritoneum, ſmall as well as great, of which we have ſometimes a melancholy proof in the operation of hernia, in which the ſtitching the wound according to the whimſical improvements of ſome modern ſurgeons, or where the mere tying of the ſac, as in the practice of the old rupture-doctors and caſtrators, often raiſed ſuch inflammation as ſpread very quickly over the abdomen, and ended in gangrene.

The firſt principle, therefore, and the thing moſt to be ſpoken of in explaining wounds of the belly, is this tendency of the peritoneum to inflame: and the cauſe which immediately excites this inflammation muſt be ſtill more noticed. For though this inflammation may no doubt come on from the ſlighteſt ſcratch in the peritoneum itſelf, yet, in general, it ariſes rather from the wound of ſome one of the viſcera: If an inteſtine be wounded, it pours out its fæces into the abdomen; if the liver, ſpleen, or kidney be wounded, theſe pour out blood; if the bladder, then the urine filters into the cavity of the belly. The food, or fæces, or urine, or blood, are as foreign bodies lying in the cavity of the abdomen, which no activity of the abſorbents can remove. They remain there as foreign bodies, which

ſoon cauſe inflammation; there follows a knotting together, and great diſorder of all the inteſtines attended with intenſe vomiting, excruciating pains, hickup, a quick, weak, and fluttering pulſe, mortification of the bowels, and then a low delirium cloſes the ſcene.

Wounds of the head are deadly, from the oppreſſion of the brain; and there delirium or coma are the deadly ſigns. Wounds of the breaſt are fatal, by the oppreſſion of the lungs; and there difficult breathing, toſſing, coughing of blood, coldneſs of the extremities, and a faultering pulſe, are the mortal ſigns. Wounds of the abdomen are mortal, by the inflammation and gangrene; and the ſigns of danger are, ſwelling of the abdomen, intenſe pain, vomitings, coſtiveneſs, hickup, faintings, then an interval of deceitful eaſe, which is merely a ſign of internal gangrene, and of the near approach of death.

Thus you perceive that a lecture on wounds of the abdomen muſt be a lecture on inflammation of that cavity, and of the various ways in which it is produced. It is alſo but too plain, that here we are ſpectators merely, or with kinder thought of watching over our patients, and doing the little that art can do; but that in general we have no other privilege than that of pronouncing whether he is likely to live or die. This alſo muſt be remarked, that while laying down the general principles, we would be ready to pronounce every wound of the abdomen muſt be mortal; but when we deſcend to the particular caſes, we have ſuch ſtrange examples of unexpected cures, that we are ready to retract our firſt poſition, believing that hard-

ly any wound is deadly; and the reaſon of this deception muſt alſo be obſerved. Having put it down as a prognoſtic, which is but too well confirmed, by much melancholy experience, that wounds of the belly are mortal, there is no reaſon why we ſhould, in recording our caſes, take any note of a man having died after ſuch a wound; death, from ſuch a wound is a daily and expected occurrence, and therefore it is not marked; but, if we find that a man has eſcaped, are we not to record every ſuch eſcape? Is it not our duty to ſet up and marſhal in fair array all the poſſible wounds, to mark out which are poſſibly ſafe, and which are abſolutely mortal; to diſtinguiſh the various accidents of all the various wounds; and to try whether by ſuch obſervations we can leſſen their dangers? Thence it comes to paſs, that, in one ſhort ſentence, we announce the general principles of ſuch wounds,—in one ſhort and general prognoſtic we declare them to be fatal; we thus beſtow but a few moments on their general character, while we ſpend hours in marking their leſſer varieties, and in recording all the accidents and chance cures, collecting evidence about hair-breadth eſcapes, till we almoſt loſe ſight of the general principle which proves ſuch wounds to be mortal. This confuſion muſt be peculiarly felt by a diligent ſtudent, who, the more he reads, the more he wanders, finds anuſes at the groin, and miraculous recoveries in every book, and reads of cures, till he forgets that there are dangers.

In judging of wounds of the lower belly, much muſt be taken into account before we form our opi-

nion. We are often likely to be deceived; we ſee the patient lying quiet and eaſy, while we know that he is on the very brink of danger; and there is often great confuſion and alarm when the patient is abſolutely ſafe; for balls ſometimes turn ſo, that a ſhot ſhall paſs through among all the bowels, without wounding one; though it muſt be acknowledged, that the belly is ſo full of parts eſſential to life, that there can hardly be a wound of the abdomen in which one or other of the bowels is not concerned.

Our patient feels little in the moment of the wound, ſave that confuſion, trembling, and alarm which is the immediate conſequence of fear, but which is allayed by time and a ſlight opiate, or a cordial draught.

If ſtools come on ſoon after the wound, and if the belly continue regular and eaſy but for a few days, it is a comfortable aſſurance (or it is almoſt an aſſurance) that the bowels are unhurt.

If, on the ſecond, third, or fourth day, a ſwelling, pain, and burning fever come on, if ſoon after there come dreadful torments, then the belly is completely inflamed, and the danger very great; the bowels will mortify, and the patient being ſuddenly relieved from pain, will be eaſy for a few hours, and will ſink, after this deceitful interval, into a low and muttering delirium, and die.

If this threatening inflammation be kept off by profuſe bleeding, by low diet, and by abſolute reſt; or if it be thus ſubdued after having begun, then the chief danger is over, and the patient is in ſome degree ſafe-

Yet ſometimes the belly is eaſy, and the bowels regular for ſome days, when moſt unexpectedly fæces appear at the outward wound; which accident throws us back into great conſternation; it is a ſign of great danger; for often, though the bowels are wounded, yet from their emptineſs, or the cloſeneſs of the wound, or from vomiting, or by ſome other chance, the fæces are not at firſt diſcharged through the wound. And again, though the belly continuing regular and eaſy for many days is no doubt a proof that the inteſtines are not wounded, it is by no means a perfect ſecurity that they are not hurt; for the ball may have bruſhed through among them with ſuch velocity that the inteſtines may be be bruiſed like the external wounds, the hurt parts of the inteſtines may ſlough off, and the inteſtines opening from ſuch a cauſe, on the ſixth, eighth, or tenth, or fifteenth day, will pour out their fæces into the cavity of the abdomen. The ſigns of theſe two kinds of injury to the inteſtines are very plain; for, if there be a direct wound of the bowels, there will be an immediate interruption of ſtools, immediate ſwelling of the belly, vomiting, hickup, and death: or, on the other hand, there may come, after many days of free paſſage in the belly, a ſudden interruption of the ſtools, with as ſudden a ſwelling and hardneſs of the belly, then vomiting, hickup, and death; and then we find upon diſſection, that this ſudden death has been from a gangrene of the bowels, which had been bruiſed in the rapid paſſage of the ball, the eſchar of that gangrene not breaking till the eighth or tenth day.

Since, then, this ſlough of the bruiſed inteſtines will fall out about the time of the inflaming of the wounds, we never can be without great anxieties about our patient's ſafety, till after the ſloughing of the wounds is over: and even then our patient is only in ſome degree, but not entirely, ſafe; for there is another danger ſtill:

The two wounds, viz. the entrance and the exit of the ball, being gun-ſhot wounds, continue dead and callous for five or ſix days; then the bruiſed parts recover their action,—inflame, ſwell, and throw off their putrid ſloughs. It is but too plain, that this inflammation of the external wound may be communicated to the whole cavity of the abdomen, and the inflammation of the abdomen may be thus renewed. This alſo, is to be guarded againſt; and therefore we do not relent in bleedings, low diet, perfect and abſolute reſt, till the fifteenth or twentieth day.

If, unhappily, the ball has not paſſed through, but remains ſomewhere within the abdomen, other fears and dangers await us, which bring to our remembrance, the aphoriſm concerning wounds of the thorax, that "while the ball remains within the thorax, the patient, though ſaved from the firſt dangers, is expoſed to tedious ſuppurations, incurable ſores, hectic, waſting, and death;—and nothing ſo wearies the ſurgeon, nor depreſſes the patient's hopes, as an unceaſing flow of matter, and a fiſtulous ſore."

Here, alſo, the patient is peculiarly expoſed to waſting ſuppurations, and to ſtill greater dangers. The ball, if it have entered near the navel, or upon the

middle line of the belly, will ſtick in the lumbar vertebræ, and will cauſe paralyſis of the bladder and lower extremities, ſoon followed by death, If it have paſſed obliquely through the abdomen, or to one ſide of the middle line, it will lodge in the thick fleſh of the Iliac, or Pſoas muſcle; and the patient after having paſſed through the firſt dangers, feels little more than a weight and wearineſs of the loins; but when he raiſes himſelf to ſit up in the bed, the wearineſs is converted into pain. Sometimes the ball makes a bed for itſelf, and lies harmleſs in the loins;—ſometimes alſo, if the ſhot has entered near the pubis, by paſſing over the thigh, and has gone obliquely upwards, there is a frequent draining of matter, and a ſmall fiſtulous ſore; but moſt frequently of all, the outward wound cloſes, the patient is never relieved from a dull and heavy pain, never recovers the free uſe of his limbs, nor is able to ſupport his body erect, but waſtes under a ſlow hectic fever; and when he dies, there is found a great abſceſs in the loins.

Sometimes a ball, paſſing obliquely, not from below but upwards, from above downwards, enters the belly, breaks ſome of the bones of the pelvis, paſſes out perhaps through the middle of the haunch bone;—and there a very free dilatation is required, both to make an open wound, and to take away the ſplinters of ſo large a bone, and to prevent matter forming within the pelvis, and inflaming the abdomen.

Sometimes a ball, entering over the thigh, and near Poupart's Ligament, or about the ring, ſeems to paſs into the abdomen, while, in fact, it goes behind the

peritoneum, courſes along the bones, lodges about the Ala Ilii, or perhaps goes ſo high as the loins. There the inflammation is ſubdued by bleeding, and never reaches the abdominal cavity; or if it threaten to do ſo, it is eaſily reſtrained; a fiſtulous ſore enſues; at times it gleets profuſely; then it ſtops, with ſwelling and pain, not without danger; again it burſts out, and runs freely, and pieces of cloth, and fractured or ſpoiled bones are from time to time diſcharged; the finger, or probe, are ſometimes introduced in ſearch of the ball; ſometimes we feel an indiſtinct rub, as in ſounding for the ſtone; then it diſappears; then we feel it again; and again it diſappears; till at laſt, in a lucky hour, the ball preſents itſelf at the groin, and is pulled away. In all this, there is an appearance, of the ball's changing place, ſo ſtrong, as to encourage us to try at laſt what poſture will do; for turning often upon the belly has actually brought ſuch balls towards the groin; which need not ſurpriſe us, when we ſee balls not lodged, as in this caſe, among a looſer cellular ſubſtance, but, in the ſolid fleſh of the limbs, work downwards by poſture, and their own weight.

Often, when balls go down into the pelvis, they are fatal by the wound being in the bladder, and the urine getting into the abdomen; or by cauſing a high and gangrenous inflammation; or by the thickneſs of the bones that are broken, producing long ſuppuration, and an incurable ſore: But ſometimes the firſt inflammation being ſubdued, ſuch balls lodge about the bones; and we can neither conceive where they can be ſo effectually concealed, nor how they can lie

there without danger or pain.—Sometimes, however, the ball lies looſer, falls down into the bottom of the pelvis, and produces tumor there; and once Mr. Boerdenave, after ſuch a wound, feeling a fluctuation in the perineum, made a lithotomy-like inciſion, and got out ſome pieces of ſhirt, much urine, much clotted blood, and the ball, ſo that his patient was perfectly cured.

Having ſpoken of this inflammation of the peritoneum, as the chief cauſe of danger, let me next explain to you, how this ſame inflammation is alſo (by cauſing an adheſion of the wounded bowel) the only means of ſafety; for if a wounded or diſeaſed bowel were to continue but a few hours unattached to the abdomen, it muſt be fatal. If the liver be inflamed, it adheres to the peritoneum; their ſubſtances are ſo mixed, that they become as one, and then the pus, gathered within the ſubſtance of the liver, inſtead of being poured out into the abdomen, makes its way outwards, and ſo the abſceſs burſts, or is punctured, and heals. In dropſy of the ovarium, we ſhould not dare to tap the patient, leſt the inteſtines ſhould be betwixt the integuments and this dropſical ſac, but that we know, how the ſac of the diſeaſed ovarium unites itſelf, by inflammation, to the inner ſurface of the peritoneum, as ſoon as they touch each other. If a fœtus be conceived in the ovarium, or be by laceration thrown out of the womb, the woman, if ſhe ſurvive, is freed from her burden by the ſac which encloſes the child adhering to the inner ſurface of the abdomen, where abſceſs forms, and the fœtus is

expelled piecemeal, bone after bone, till the whole is diſcharged. In hernia, an adheſion of this kind ſaves the life; for the inteſtine, which is hurt in the ſtricture of a hernia, is ſtrangulated, inflames, mortifies and burſts; and then it would go back into the belly, caſt out its putrid fæces there, and ſo prove fatal, but that the gut always inflames before it mortifies; during that ſtate of inflammation, it is hard driven into the ring; there it is fixed, adheres, is ſtraitened more and more, till the mortification is complete. But obſerve how this is effected; all that is below the ſtricture mortifies; all that is above it is ſound; all that is in the very ſtrait of the ring is highly inflamed, and has ſo adhered, that before the lower part mortifies, this part is firmly fixed in its place; and when the mortified part burſts out, the inflamed part keeps its place in the groin, adhering to the ring. It is thus that the preternatural anus is formed, and the ſurgeon, in ſewing ſuch an inteſtine to the ring, takes uſeleſs pains to fix what has already adhered; if there be a work of ſupererogation in ſurgery, as I believe there are but too many, ſurely this of ſewing an inteſtine is one.

This it is which makes the chief difference, in point of danger, betwixt an ulcerated and a wounded inteſtine; for, in a wound, there is, as we ſhould ſuppoſe, no time for adheſion, nothing to keep the parts in contact, no cauſe by which the adheſion might be produced: But, in an ulcer, there is a ſlow diſeaſe, tedious inflammation, adheſion firſt, and abſceſs and burſting afterwards; ſometimes a fiſtula remains, diſ-

charging fæces, and ſometimes there is a perfect cure. If a nut-ſhell, a large coin, a bone, or any dangerous thing be ſwallowed, it ſtops in the ſtomach, cauſing ſwelling, and dreadful pain; at laſt, a hard firm tumor appears, and then it ſuppurates, burſts, the bowel opens, the food is diſcharged at every meal, till the fiſtula gradually leſſens, and heals at laſt:—But where the ſtomach is cut with a broad wound of a ſabre, the blood from the wounded epiploic veſſels, or the food itſelf too often pours out into the abdomen, and the patient dies. In the ſame way, if the piece of bone, or the coin go down into the inteſtines, and ſtick in ſome narrower turn, cauſing an inflammation there, or if worms, neſtling in the bowels, hurt them, the inflammation of the hurt inteſtine unites it to the peritoneum, abſceſs forms and burſts, the worms, or coin, or piece of bone, are diſcharged, the fiſtula heals, and all is ſafe: But if the ſame piece of inteſtine were wounded with a ball, much more if with a clean cut of a ſabre, how could it fail to pour its fæces into the abdomen, or what could keep the wound of inteſtines oppoſite to the external wound, or cauſe them to adhere? Why, there is one cauſe but little noticed, perhaps, and yet of conſiderable effect, which, though it cannot always prevent the diſcharge of fæces into the abdomen, often does.

I am well perſuaded, that the inteſtines, move leſs, in reſpect to their appropriated point of the abdomen, than their croakings in flatus, or their motion in our experiments upon opening animals, ſhould lead us to

ſuppoſe *. We ſee the bowels looſe and floating, when we open a body! we ſee them hanging by the meſentery, and we call it a ligament for ſupporting the bowels! and we ſee bowels turning over each other, in the cruel experiments which we make upon living creatures †. Theſe circumſtances make an impreſſion

* When I ſpeak of their motions, in our experiments upon animals, I mean to allow, for the ſake of argument, more than can eaſily be proved:—For I muſt mention to you, after all that has been ſaid about periſtaltic, vermicular, and antiperiſtaltic motions, that you may cut open twenty live cats, and never have the luck to ſee the leaſt degree of motion in their inteſtines, nor any ſuch thing. Vid. Memoires de l' Academie des Sciences.

† It is only, after having given the creatures the moſt acrid poiſon, that we can ſee violent contortions of the bowels; we ſeldom ſee any thing like this in the natural condition of the bowels.—We ſee nothing like it, when the bowels of a human ſubject are among our hands, as in wounds or in herniæ.—We feel nothing like it, when, after rupture of the womb, we follow the child into the abdomen, with our hand, to extract it.—I have ſeen a child born, wanting all the integuments of the abdomen, the peritoneum only covering the bowels, and as tranſparent as a piece of the fineſt oiled paper;—and there I ſaw no motion, though I often looked with anxious attention, both while the child was aſleep, and when it was ſtruggling, being awake; and I have kept the preparation, to authenticate as much of the fact, as a preparation can explain.—I have looked, with the ſame degree of attention, to the bowels of a man, who, having thrown himſelf from a great height, had burſt the abdomen entirely, ſo that all the bowels hung out.—I have, indeed, not been guilty of cutting open the bellies of many cats or pigs, but I have a very poor opinion of the proofs which will ariſe from ſuch experiments, from all that I have hitherto ſeen.—That there is a motion in the inteſtines, it were very bold and ignorant to deny; but that there is that kind and degree of motion which has commonly been deſcribed, I am very far from believing.

which it is not eaſy to forget; and yet, when we talk of blood, or of fæces falling into the cavity of the abdomen, as if there were there ſome empty ſpace, ſuch as we ſee upon opening a dead body, I fear that we have a very poor notion of the abdomen, very unlike the truth.

There is not, truly, any cavity in the human body, but all the hollow bowels are filled with their contents,—all the cavities filled with their hollow bowels, and the whole is equally and fairly preſſed. Thus, in the abdomen, all the viſcera are moved by the diaphragm and the abdominal muſcles, upwards and downwards, with an equable continual preſſure, which has no interval; and one would be apt to add, the inteſtines have no repoſe, being kept thus in continual motion; but though the action of the diaphragm, and the re-action of the abdominal muſcles, is alternate, the preſſure is continual; the motion which it produces, is like that which the bowels have, when we move forwards in walking, having a motion with reſpect to ſpace, but none with regard to each other, or to the part of the belly, which covers them;—the whole maſs of the bowels is alternately preſſed, to uſe a coarſe illuſtration, as if betwixt two broad hands, which keep each turn of inteſtine in its right place, while the whole maſs is regularly moved:—When the bowels are forced down by the diaphragm, the abdominal muſcles recede; when the bowels are puſhed back again, it is the re-action of the abdominal muſcles, that forces them back and follows them; there is never an inſtant of interruption of this preſſure, never a moment

in which the bowels do not preſs againſt the peritoneum; nor is there the ſmalleſt reaſon to doubt, that the ſame points in each are continually oppoſed. We ſee, that the inteſtines do not move, or, at leaſt, do not need to move, in performing their functions; for, in hernia, where large turns of inteſtines are cut off by gangrene, the remaining part of the ſame inteſtine is cloſely fixed to the groin, and yet the bowels are eaſy, and their functions regular. We find the bowels regular, when they lie out of the belly in hernia, as when a certain turn of the inteſtine lies in the ſcrotum or thigh, or in a hernia of the navel; and where yet they are ſo abſolutely fixed, that the piece of inteſtine is marked by the ſtraitneſs of the rings. We find a perſon, after a wound of the inteſtine, having free ſtools for many days; and what is it that prevents the fæces from eſcaping, but merely this regular and univerſal preſſure? We find a perſon, on the fourth or fifth day, with fæces coming from the wound! a proof, ſurely that the wound of the inteſtine is ſtill oppoſite, or nearly oppoſite to the external wound. We find the ſame patient recovering without one ill ſign! What better proof than this could we deſire, that none of the fæces have exuded into the abdomen?

If, in a wound of the ſtomach, the food could get eaſily out by that wound, the ſtomach would unload itſelf that way,—there would be no vomiting, the patient muſt die; but ſo regular and continual is this preſſure, that the inſtant a man is wounded in the ſtomach he vomits, he continues vomiting for many days, while not one particle eſcapes into the cavity of the

abdomen: The outward wound is commonly oppoſite to that of the ſtomach, and by that paſſage ſome part of the food comes out; but when any accident removes the inward wound of the ſtomach from the outward wound, the abdominal muſcles preſs upon the ſtomach, and follow it ſo cloſely, that if there be not a mere laceration extremely wide, this preſſure cloſes the hole, keeps the food in, enables the patient to vomit, and not a particle, even of jellies or ſoups, is ever loſt, or goes out into the cavity of the belly.

How, without this univerſal and continual preſſure, could the viſcera be ſupported? Could its ligaments, as we call them, ſupport the weight of the liver—or what could ſupport the weight of the ſtomach when filled? Could the meſentery or omentum ſupport the inteſtines—or, could its own ligaments, as we ſtill name them, ſupport the womb? How, without this uniform preſſure, could theſe viſcera fail to give way and burſt? How could the circulation of the abdomen go on? How could the liver or ſpleen, ſo turgid as they are with blood, fail to burſt? Or what poſſibly could ſupport the looſe veins and arteries of the abdomen, ſince many of them, *e. g.* the ſplenic vein, is two foot in length, is of the diameter of the thumb, and has no other than the common pellucid and delicate coats of the veins? How could the viſcera of the abdomen bear ſhocks and falls if not ſupported by the univerſal preſſure of ſurrounding parts? In ſhort, the accident of hernia being forced out by any blow upon the belly, or by any ſudden ſtrain, explains to us how perfectly full the abdomen is, and how ill it is able to bear any

preſſure, even from its own muſcles, without ſome point yielding, and ſome one of its bowels being thrown out. And the ſickneſs and faintneſs which immediately follow the drawing off of the waters of a dropſy, explain to us what are the conſequences of ſuch preſſure being, even for a moment, relaxed.

But, perhaps, one of the ſtrongeſt proofs is this, that the principle muſt be acknowledged, in order to explain what happens daily in wounds; for, though in theory we ſhould be inclined to make this diſtinction, that the hernia or abſceſs of the inteſtines will adhere and be ſafe, but that wounded inteſtines not having time to adhere, will become flaccid, as we ſee them do in diſſections, and ſo falling away from the external wound, will pour out their fæces into the abdomen, and prove fatal; though we ſhould ſettle this as a fair and good diſtinction in theory, we find that it will never anſwer in practice. Soldiers recover daily from the moſt deſperate wounds; and the moſt likely reaſons that we can aſſign for it are, the fullneſs of the abdomen, the univerſal, equable, and gentle preſſure; and the active diſpoſition of the peritoneum, ready to inflame with the ſlighteſt touch; the wounded inteſtine is, by the univerſal preſſure, kept cloſe to the external wound, and the peritoneum and the inteſtine are equally inclined to adhere; in a few hours that adheſion is begun which is to ſave the patient's life, and the lips of the wounded inteſtine are glued to the lips of the external wound. Thus is the ſide of the inteſtine united to the inner ſurface of the abdomen; and though the gut caſts out its fæces while the wound is

open, though it often caſts them out more freely while the firſt inflammation laſts; yet the fæces reſume their regular courſe whenever the wound is diſpoſed to cloſe; or if the fæces ſhould not reſume their natural courſe, we may force them onwards, by cloſing the wound with a plaſter, thus healing the fiſtula, which otherwiſe might never cloſe.

The two chief points of this doctrine are curiouſly proved by a caſe delivered by Mr. Littre, anno 1705, it is the caſe of a madman who ſtabbed himſelf with eighteen deep wounds, in the belly, and of theſe eighteen wounds, made with a long and ſharp pointed knife, eight penetrated into the cavity of the abdomen. The fever, pain, ſwelling, and difficult breathing, with vomiting and purging, proved them to be dangerous wounds; vomiting of blood, and clots of blood diſcharged by ſtool, proved that the wounds touched the ſtomach and inteſtines; yet deſperate as this caſe appeared, in two months the man was entirely reſtored. But here lies the important point; his madneſs came upon him again, and about eighteen months after, he threw himſelf from a high window, and died upon the ſpot: Upon opening his body, it was found, firſt, that the liver had been wounded, and had adhered in its middle lobe to the inner ſurface of the peritoneum; ſecondly, the jejunum had been wounded, juſt below the ſtomach, with a cut half an inch in length, acroſs the gut, and this inteſtine lying deep, was not preſſed againſt the internal ſurface of the belly, but was kept in cloſe contact with a contiguous turn of the ſame gut. The two turns of in-

teſtine adhered to each other; on the one inteſtine was the ſcar of the wound, while the other turn of inteſtine to which it had adhered was ſound. Thirdly, The right ſide of the colon had been wounded with a cut of an inch in length; the ſcar which it left was half an inch long; the adheſion here was to the inner ſurface of the peritoneum, by eighteen or twenty long thread-like tags of cellular membrane, or of peritoneum, iſſuing from the inner ſurface of one of the greateſt ſcars in the belly.

Surely theſe things prove that the univerſal preſſure within the abdomen is ſo uniform and conſtant, that not one only, but all the viſcera of the abdomen may be deeply wounded, and yet no blood nor fæces be allowed to eſcape. They prove that this univerſal preſſure keeps all the parts ſo in contact that they have the faireſt opportunity of adhering. The particular manner in which the wounded turn of the duodenum had adhered to the oppoſite ſound turn of the ſame gut, proves, that, towards which ſide ſoever a wounded inteſtine is preſſed, it there finds the parts diſpoſed by a ſort of contagion, to inflame, and to adhere. And one thing appears to me very curious in this proceſs of nature, that as ſoon as wounded parts adhere, then all the dangers of ſpreading inflammation ceaſe; ſo that it is not by the ſtopping of the inflammation at the true point, that the wounded part adheres; but it is rather by the adhering of the wounded part that the inflammation is prevented from ſpreading wide over all the ſurfaces within the abdomen, juſt as the obliterating of an inflamed vein, by putting its

ſides together with a compreſs, ſtops the progreſs of the inflammation along that vein.

In ſhort, if any man had made experiments like theſe, upon animals, with the hopes of proving ſuch a doctrine as that which I have propoſed, he would have been very vain of his ſucceſs.

Our good old ſurgeon Wiſeman has ſaid with great ſimplicity, as a great many have ſaid after him, "Thus it frequently happeneth that a ſword paſſeth through the body without wounding any conſiderable part:" he means, that a rapier or ball often paſſes quite acroſs the belly, in at the navel, and out at the back, and that (without one bad ſign) the patient recovers, and (as has very often happened) walks abroad in good health, in eight days; which ſpeedy cure has been ſuppoſed to imply a ſimple wound, in which all the bowels have eſcaped: But we ſee now *how* this is to be explained; for we know, that in a thruſt acroſs the abdomen, ſix turns of inteſtine may be wounded,—each wound may adhere; adheſion, we know, is begun in a few hours, and is perfected in a few days; and when it is perfect, all danger of inflammation is over; and when the danger of inflammation is over, the patient may walk abroad; ſo that we may do juſt as old Wiſeman did in this caſe here alluded to*, "Bleed him, and adviſe him to keep his bed and be quiet." In ſhort, a man thus wounded, if

* Page 98. The caſe of a man who was wounded acroſs the belly, and well, and abroad in ſeven days.

he be kept low, has his chance of eſcaping by an adheſion of the internal wounds.

Thus you ſee I have made good that axiom which I laid down at the head of this diſcuſſion, too long perhaps, but which I could not avoid, viz. "That this tendency of the peritoneum to inflame, which is the chief cauſe of danger, is alſo the only means of ſafety." And having laid down the principles upon which you are to calculate the dangers of each wound, it will be eaſy for you to underſtand the diſtinction of wounds; you will naturally apprehend, that this (like many other proviſions of nature) too often fails; and that there will be danger of fæces getting out into the abdomen, juſt in proportion to the broadneſs of the wound, or according to the bowel that is ſtruck. If the ſtomach be wounded, there is reaſon to fear leſt that bag, which lies ſo deep, and ſinks ſo much under the weight of the liver, when emptied of its contents, ſhould fall away from the outward wound. If a ſmall inteſtine be wounded, there is more reaſon to hope, that the general preſſure will keep it in cloſe contact with the walls of the abdomen, ſo as to give it an adheſion to the wound. If the great gut be wounded, near either of the groins, our chance is mended ſtill more, for the caput coli, and its ſigmoid flexure, are ſo fixed down to the loins, as to ſecure us againſt many accidents.—The wound of that gut will not forſake the wound of the abdomen; the fæces will ſurely eſcape into the cavity of the belly; the inteſtine will not be ſo likely to double upon itſelf, and protrude, like a prolapſus ani,

an accident which the floating inteſtines are peculiarly ſubject to, when they have been engaged in herniæ, and have gangrened, ſo as to have formed an anus at the groin. Laſtly, By the cloſe connection of the bottom, eſpecially of the caput coli, with the thick and fleſhy parts of the loins, it eaſily heals. All this has been obſerved a hundred times, when this great gut has been engaged in herniæ, or when worms, cherry ſtones, bones, leaden bullets, or other dangerous things, have remained in it, ſo as to cauſe an abſceſs with diſcharge of fæces in the groin, or when the wounds of ſwords have penetrated into the gut.

But other concluſions may perhaps ariſe from the doctrine of univerſal preſſure, which, once ſettled and acknowledged, would prove fatal to one of the moſt approved theories of the preſent day; for, if there be any one general doctrine in modern ſurgery univerſally received, and having a general influence on practice, it is this, that air being admitted into the cavities of ſhut ſacs, cauſes an inflammation, which runs round the whole membrane; diſorders all the parts contained in it; and almoſt always cauſes death, whether it be by ſuddenly hurting the vital parts, as when the inflammation is in the head, breaſt, or belly; or, whether it be by hectic, and a ſlow fever in wounds of the leſs important parts, as of the burſæ, or joints. And yet if there be any one doctrine, which the common laws of philoſophy ſeem to con-

tradict, it is this; for how air ſhould (according to the now vulgar phraſe), "get acceſs to the cavity of a ſhut ſac," it is not eaſy to conceive. Whatever has become a general opinion muſt command reſpect; and, therefore, while I propoſe ſome doubts on this ſubject, I hope that they will be conſidered as doubts merely, not as refutations; for doubts concerning a general opinion, will ariſe in a man's mind, long before a perfect refutation can be accompliſhed. It ſeems to me, that there are here chiefly two points to be ſettled, 1ſt, Whether air really can be admitted thus into the cavity of the abdomen? 2d, Whether, though air were freely admitted, it be capable of producing thoſe dreadful effects which are aſcribed to it.

If there be any truth in the doctrine which I am trying to eſtabliſh, there can be but very little reaſon in the common theory of air being admitted among the bowels. Suppoſe a wound of an inch in length: —ſuppoſe the bowels to have ſunk, in ſome ſtrange way, into the pelvis, for example, ſo as to have left a mere vacuum; what ſhould happen with the flexible parietes of the abdomen? Should they ſtand rigid, while the air ruſhed into the cavity to fill it? No ſurely. But, on the contrary, the walls of the abdomen would fall together, and the preſſure of the outward air, far from making the air ruſh in by the outward wound, would at once lay the belly flat, and cloſe the wound. But ſince the walls of the abdomen are not flaccid, nor the cavity empty, but the abdomen full, and the flat muſcles which cover it

acting ſtrongly, the effect muſt be much more particular; for, the moment that the belly is wounded, the action of the muſcles will force out part of the bowels; the continuance of that action is neceſſary to reſpiration; the reſpiration continues as regular after the wound as before; and the continual preſſure of the abdominal muſcles and the diaphragm againſt all the viſcera of the abdomen prevents the acceſs of air ſo effectually, that though you ſhould hold ſuch a wound open with your fingers, no air could paſs into the abdomen, further than to that piece of gut which you firſt touch with your finger, when you thruſt it into the abdomen: Nothing is abſolutely expoſed to the air, except that piece of inteſtine which is without the abdomen, or that which you ſee, when you expoſe a ſmall piece of the bowels, by holding aſide the lips of the wound. The preſſing forward of that piece, and the protruſion of a portion of the gut, proportioned always to the ſize of the wound; the preſſure from behind keeping that piece protruded, ſo that it is with difficulty that you can puſh it back with your finger; this inceſſant preſſure in all directions, is an abſolute ſecurity againſt the acceſs of air. The inteſtine comes out, not like water out of a bottle, the place of which muſt be ſupplied by air entering into the bottle, in proportion as the water comes out; but the gut is puſhed down by the action of the muſcular walls of the abdomen, and that action follows the inteſtine, and keeps it down, and prevents all acceſs to the air, whether the gut continue thus protruding, or whether it be reduced; for if it be re-

duced, the walls of the abdomen yield, allowing it to be thruſt back, but admitting no air. Thoſe who want to know the effect of air, diffuſed within the cavity of the abdomen, muſt make other experiments, than merely cutting open pigs bellies;—they muſt give us a fair caſe, without this unneceſſary wound. —We will not allow them to ſay, when they cut open the belly of any creature with a long inciſion, that the inflammation ariſes from the air:—Much leſs ſhall we allow them to ſay, when they open the belly with a ſmaller inciſion, that, by that little inciſion, the air gets into the abdomen, or that all the bowels are expoſed to the air. They muſt not cut open the bellies of their animals; they muſt merely puncture them, and then blow them up.

But this reaſoning goes ſtill further; for it proves, that air can have no acceſs to the cavity of any abſceſs, which is contiguous with the abdomen; for the continual motion of the walls of the abdomen, with the continual motion and preſſure of the bowels, will keep the walls of ſuch abſceſs in continual contact with each other, except in ſo far as they are dilated and ſeparated by matter formed within the abſceſs, or by foul air generated along with that matter. I am ſure Mr. Abernethy will pardon my mentioning his book here, ſince I do it in no unfriendly way: He ſhould have gone a point farther than he has ventured to do; he might have denied, upon the ſoundeſt principles, that the air ever has acceſs to the cavity of a lumbar abſceſs; for the air cannot enter ſuch an abſceſs while it lies, as it does, deep in the cavity of

the abdomen, under the weight of all the viſcera, and continually preſſed by the motion of its muſcles; nothing could fill a lumbar abſceſs with air, but actually inflating it from the orifice at the groin*."

This effect, alſo, I would number up along with all the other conſequences of the continual and univerſal preſſure within the cavity of the abdomen. It is this preſſure which gives a continual and gentle motion to the viſcera, continual ſupport to them in their ſeveral offices, and a protection to their looſe and turgid blood-veſſels, without which they would burſt. When the bowels are wounded, this preſſure throws out the fæces, and keeps up the inteſtines cloſe to the wound. When the veins or arteries are wounded, it prevents the blood ſpreading into the abdomen, confining it in particular ſacs, and forming clots cloſe round the wounded veſſels. It is this univerſal preſſure, alſo which, when the belly only is wounded, (and not the bowels), prevents the acceſs of air; ſo that air does not enter, even to fill up the room of the very piece of inteſtine which is forced through the wound. And this, perhaps, among others, is one cauſe why hydatids, which are generated by the burſting of the pregnant ones, do not fall downwards in the abdomen, from the upper parts where they are commonly lodg-

* Any perſon, at all acquainted with the economy of reſpiration, will have obſerved, that I have mark d this in a particular manner; that though the preſſure and relaxation is indeed alternate, with regard to the lungs, it is continual and unremitting, with regard to the abdominal viſcera, and all the parts connected with the abdomen, which are as much preſſed during expiration, as during inſpiration.

ed, but are found more commonly on the liver, and ſticking about the higher regions of the abdomen; while there is but one inſtance, I believe, of a hydatid having gotten down into the pelvis, betwixt the rectum and bladder, ſo as to choke the bladder and cauſe a ſuppreſſion of urine which proved fatal.

Perhaps, this doctrine, about the admiſſion of air and its dangerous effects, has been allowed to paſs unqueſtioned, for its father's ſake, that having been hitherto granted on his authority which I ſhall be ſo adventurous as to deny, viz. "That air is a fluid ſo acrid and ſtimulating, that, being admitted into a ſhut ſac, nothing can equal its terrible effects."

That the vulgar ſhould believe the firſt ſuperficial impreſſion that ſtrikes them, of air hurting a wound or ſore, is by no means ſurpriſing; but it is not natural, that men, bred to philoſophy, ſhould allow ſo ſtrange an aſſertion as this, without ſome kind of proof: that the air which we breathe, and which we feel upon the ſurface ſo bland and delightful, ſhould have ſo oppoſite a relation to the internal parts, that it ſhould there be a ſtimulus more acrid and more dangerous than the urine or bile,—is not to be believed upon ſlight grounds. I do affirm, that it remains to be proved, that this fluid, which ſeems ſo bland and pleaſant to all our ſenſes, and to the outward ſurface is yet a horrible ſtimulus, when admitted, as a celebrated author grandly expreſſes it, "into the deep receſſes of our body*."—"This ſtimulant power of the

* *Vide* Monro's Burſæ Mucoſæ.

air is the reaſon," ſays he, "why I have always inculcated in my Lectures, but, moſt eſpecially, ſince that period (viz. the year 1771)†, the advantages which would attend the excluſion of the air from the deep receſſes of the body, in performing DIFFERENT operations, and in treating wounds ACCIDENTALLY INFLICTED." That all this is not impoſſible in nature, we muſt acknowledge; but the author, from whom I quote, will, I am ſure, forgive me for ſaying it is not proved; I am entitled to ſay, that it is not proved; and, from the following obſervations, I am even inclined to believe, that the doctrine is abſolutely falſe, and all the concluſions from it, dangerous and quite wrong.

The air, for inſtance, eſcapes from the lungs in a fractured rib, and firſt goes abroad into the thorax; then into the cellular ſubſtance; then the emphyſematous tumor appears; but often, without any ſcarifications, with very little care or aſſiſtance on our part, the air is abſorbed, the tumor diſappears, and without inflammation of the cheſt, or any particular danger, the man gets well:—Here, then, is the air within the cavity of a ſhut ſac, filling the thorax, and

† One man is known by one quality, or failing, another by another.—Heiſter is remarked for ſober ſyſtematic writing, after the right German faſhion; Petit for good ſenſe, and ſound and careful obſervation; and Garengeot for tales like that about the ſoldier's noſe. The author, from whom I have quoted the above paſſage, will be eaſily known by his attention to dates, about which he makes himſelf, and every body around him, quite miſerable, while the lookers on can hardly underſtand the meaning of it.

oppreſſing the lungs, without any dangerous inflammation enſuing.

That the air may be puſhed under the cellular ſubſtance over all the body, without cauſing inflammation, is very plain from the more deſperate caſes of emphyſema, where the patients, after living eight or ten days, have died, not from inflammation, but from oppreſſion merely, the body being ſo crammed with air, that even the eye-balls have, upon diſſection, been found as tenſe as blown bladders. We have alſo many ludicrous caſes of this kind, which prove this to our perfect ſatisfaction. Soldiers, or ſailors, ſometimes touch the ſcrotum with a lancet, introduce a blow-pipe, and blow it up to an enormous ſize, imitating herniæ, by which they hope to eſcape from the ſervice. The old ſtory of a man, who was ſo wicked as to make a hole in his child's head, and blow it up, that he might ſhow the child in the ſtreets of Paris for a monſter, is well authenticated; and I have little doubt, that a fellow, who knew how to do this, would blow it up every morning, and ſqueeze it out when he put the child to bed at night. Some villanous butchers, having a grudge at a ſoldier, found him lying drunk under a hedge; they made a little hole in his neck, and blew him up till he was like a bladder; or, as Doctor Hunter deſcribes the diſeaſe of emphyſema, "like a ſtuffed ſkin."

The common operation of hernia (if the being expoſed to air were really the chief cauſe of danger), is one which, in all honeſty and good faith, we ſhould give up altogether; for it conſiſts in opening the ſac,

handling the inteſtines, dilating the ring, and returning the bowels into the abdomen. As ſoon as we open the ſac, we can prognoſticate the fate of our patient: if the inteſtine be inflamed, he is not ſafe;—if it be dark-coloured, or livid, he is in imminent danger;—if it be of a ſound and natural colour, he is, in ſome degree, ſafe;—and the patient living ſo often, after the inteſtines have been thus expoſed, is a ſure proof that they are but little hurt by this expoſure to the air.

Bland as air is, when applied to the ſurface, and harmleſs as it now appears to be, though blown with a continual motion into what I am well entitled to call, the "deep receſſes of the body." And yet one author is ſo extravagant as to tell us, that it is not the inciſion for lithotomy, no, nor the pulling out of the ſtone, nor all the cruelties of that horrid operation that kills the patient, but that a great ſhare of the danger ariſes from the action of the air *; as if air, bland as it is, could ſtimulate the urinary bladder, which is both accuſtomed to bear the acrimony of the urine, and to bear it with eaſe, inſomuch that it is ſtimulated rather by the quantity than by the quality of what it holds; the bladder too, which is ſo far from having any high

* "There likewiſe ſeems to be ſtrong reaſon for ſuppoſing, that the danger, not only in the high, but in the lateral operation of lithotomy, may be leſſened, by the ſurgeon uſing every means TO EXCLUDE the air from the wound and bladder, during theſe operations, and by ſtitching the integuments after the high operation." Monro's Burſæ Mucoſæ.

degree of ſenſibility, that we can inject our alkaline water into it with but little diſtreſs to the patient.

Though " it is, no doubt, the nature of an hypotheſis, when once a man has conceived it, that it aſſimilates every thing to itſelf as proper nouriſhment; and from the firſt moment of your begetting it, it generally grows the ſtronger, by every thing you ſee, hear, read, or underſtand;" yet this natural facility of temper, which every ſpeculator, but moſt eſpecially every medical ſpeculator, ſhould be willing to acknowledge, is but a poor apology for carrying an unproved doctrine, like this, ſuch extravagant lengths; and driving with it full career, into the midſt of ſurgical practice, reforming, or at leaſt changing, the manner of every great operation. The catalogue of operations which have undergone this reformation, is curiouſly drawn out by an author of very high character, after the following manner: " A, Openings into the knee joint. B, The trepan. C, Emphyſema and empyema. D, Openings into the pericardium. E, Wounds of the abdomen. F, Cæſarean ſection. G, Lithotomy. H, The operation for hernia of the groin or thigh."

Theſe are the operations which have been put upon the new eſtabliſhment; and from ſome of theſe new operations I ſhall give ſhort extracts, chiefly, in order that it may be known, that however ill this ſlight refutation may be managed, the arguments and innovations, propoſed on the other ſide are puerile beyond all conception.

B. The improved operation of the trepan, is this, " That the ſurgeon ſhall deſiſt from ſawing, when the

innermoſt lamella becomes thin; and then ſhall break it up with the levator or forceps †. Here there are three points to be ſettled, before the improvement can be acknowledged or received; that the breaking up the bone, as we punch out an old tooth, will prevent air getting in, or will prevent harm to the dura mater; and alſo, that there are ſurgeons ſo ignorant, and ſo raſh in an operation, which requires no kind of haſte, as to drive their trepans through the dura mater, and of courſe into the brain; or it muſt be proved, that after cutting up the depreſſed piece of ſkull, the air will get into the brain, which we know well it cannot do; for the inſtant that the preſſure of the ſkull, which preſerved the balance, is taken off, the brain riſes; and if the dura mater be entire, this riſing makes the dura mater in every caſe that I have ſeen, as tenſe as a drum, and makes it bulge ſo through the trepan hole, that it is in danger of being cut upon the edges of it; if the dura mater be cut, then the brain itſelf protrudes. Or, laſtly, it muſt be proved, that air is the cauſe of the fatal inflammation; which it will

† "In the operation of the trepan, I have adviſed, that the cranium ſhould not be entirely cut with the ſaw; but that the operator ſhould deſiſt from ſawing, when the innermoſt lamella becomes ſo thin, that it can be eaſily broken off with a levator, or forceps, by which we not only avoid the danger of the inſtrument preſſing rudely on the brain, but alſo, in many caſes, the cutting of the dura mater, and admiſſion of the air to the ſurface of the brain, which experiments I made on HALF A DOZEN PIGS, near THIRTY YEARS AGO." Monro's Burſæ Mucoſæ.——N. B. Pigs have but one table in their ſkull, or no tables at all.

not be eaſy to accompliſh, nor very wiſe in any ſober man to attempt; for inflammation often comes on where there is no fracture, where no air is admitted, becauſe no operation is performed.

The true cauſes of inflammation are theſe: There is firſt the terrible blow; there is a cruſhing and fracture of the bones; there is that hurt of the dura mater, which is inſeparable from a fracture of the bones of the cranium; and there is a piece of the ſkull cut out with the trepan, which, when it is ſeparated from the dura mater, leaves that membrane bleeding at a thouſand ſmall points; all the little arteries, paſſing betwixt the dura mater and the ſkull, being torn. We muſt forget that there are any ſuch accidents as theſe in our operation, before we can aſcribe the inflammation to the admiſſion of air.

But even granting the value and high importance of this improvement, how little credit the author of it, as he calls himſelf, ſhould have, may be underſtood by the following tranſlation from Hippocrates: "Nor is the perforation to penetrate entirely into the cranium, leſt the dura mater ſhould receive ſome injury, either from the INSTRUMENT, or from a long expoſure to the AIR. To avoid this laſt inconvenience, by which it is often putrified and deſtroyed, the piece of bone within the tenebra ſhould be ſuffered to remain till it comes off of itſelf *."

C. "In the caſe of air infuſed into the cavity of the thorax, it is adviſed that the operation ſhould be per-

* Riollay's Hippocrates, p. 63.

formed with a ſmall trocar †; inſtead of which cautious method (ſays this author), Hewſon and others, following him, have propoſed an inciſion by a knife, which I have found even in experiments upon ſound animals, generally proves fatal from the degree of inflammation which the free admiſſion of the cold air creates." But let it be remembered, that the author keeps the canula ſtill in the thorax, and plugs it with a cork to preſerve an outlet for the air; —by which it is very plain, that he expects the lungs to fill the

† "In the caſe of air effuſſed into the cavity of the pleura, for which, SO FAR BACK AS M,DCC,LVIII, I ventured to propoſe the paracenteſis of the thorax, I have adviſed that the operation ſhould be performed with a ſmall trocar paſſed cautiouſly in a ſlanting direction; and, after withdrawing the ſtilette, and letting out the effuſed air, that a flexible canula, with a plug fitted to it, ſhould be introduced, in order to preſerve an outlet to the air till the wound of the lungs be cloſed; and that, before withdrawing the canula, any air remaining in the pleura ſhall be ſucked out with a ſyringe or elaſtic bottle. AND IN M,DCC,LXIX, a caſe occurred, in which, by my direction, that operation was performed nearly in this manner, with relief and ſucceſs. (See an account of this caſe communicated by Mr. Kellie, one of the ſurgeons preſent, to Dr. Duncan, and publiſhed by him in his Medical Commentaries, Vol. II. p. 427.)

"Inſtead of the cautious method above-mentioned, Mr. Hewſon (Med. Obſerv. London, M,DCC,LXVII. p. 396), and others following him, have propoſed an inciſion by a knife; which I have found, even in experiments on ſound animals, generally proves fatal, from the violent degree of inflammation which the free admiſſion of the cold air creates." In one experiment on a pig, the inflammation from the admiſſion of air by a ſmall inciſion, was ſo violent as to kill the animal, after producing an adheſion of the lungs with the upper part of the pleura, in the ſpace of thirty-ſix hours. See Monro's Burſæ Mucoſæ.

thorax with air, from time to time during the cure; ſo that if there come no inflammation in any ſuch caſe, it will not be from the want of air. He has told us alſo that ſmall inciſions or punctures are ſafe, though made with the intention of giving vent to confined air, and though kept open to let the air out from time to time; while large inciſions cauſe high inflammation:—I confeſs that theſe two concluſions ſeem perfectly natural, it is natural that if the inciſion were ſmall, the thorax ſhould be free of inflammation although full of air; and again it will naturally happen, that where the inciſions are large, the breaſt muſt inflame. In ſhort, it is plain, that inflammation, or the abſence of it, ariſes not from the preſence or abſence of the air, but from the length of the inciſion; there is no inflammation where the wound is ſmall, though it be made on account of confined air; there is inflammation where the inciſions are large, though they are made with the intention, and alſo with the effect of letting looſe the confined air. There is only one thing to be wondered at, viz. that this canula fixed ſo carefully in the thorax was not at leaſt as effectual in exciting inflammation as even the largeſt inciſion; how the pigs or men eſcaped inflammation I cannot conceive.

D. Points to caſes where the air burſting out from the alimentary canal inflamed the abdomen; and the caſes are three in number." "In the firſt caſe, the arch of the colon had been eroded by a tedious dyſentery. In the ſecond caſe, two holes were formed in the jejunum, by two pins, with their points turned

different ways, and tied together with a thread, which had been ACCIDENTALLY ſwallowed. In the third caſe, of a perſon in a typhus, the colon ſeemed to have burſt, during the operation of an emetic." This is the whole and full account of theſe caſes as delivered by the author. A tedious dyſentery, with an eroſion of the colon,—pins tied croſs-ways, and ſticking firm in the inteſtines,—and the arch of the colon burſt, and pouring out its contents, its foul air, fæces and all, into the cavity of the belly; theſe are curious examples of air cauſing inflammation. And I muſt ſay, that the phyſician has known little of practice who has not ſeen patients die in dyſentery, without the gut being eroded, or who has not ſeen emetics in typhus do the buſineſs, without any burſting of the colon.

E. That inflammation is, after the operation of Cæſarean ſection, the moſt frequent cauſe of death, it is neither hard for us to acknowledge, nor at all difficult to explain. The very directions which the author gives, imply at once a tedioufneſs and a rudeneſs in the operation, which muſt cauſe inflammation of the belly, an accident which is but too apt to happen, even when the operation is performed in the moſt gentle manner. The directions which the author gives for the operation, are to cut, firſt through the ſkin, then through the muſcles, then through the arteries then to plunge the hand at once into the womb, to get out the child; again to get out the placenta; ſtill a third time to dilate the orifice of the womb; and after theſe dreadful inciſions, and all this

tedious work, he tells us, very calmly, that the inflammation ariſes from the air. Doctor Aitken put the finiſhing hand to this joke, when, in his book, on the PRINCIPLES of SURGERY, he adviſed that we ſhould perform the Cæſarean ſection under the cover of a warm bath, the woman lying under water to exclude the air. This, though it may ſeem to be a ſcurvy piece of wit, was really propoſed in ſober ſerious earneſt.

The admiſſion of atmoſpheric air as a ſtimulus, when compared with the great inciſions of lithotomy, —of hernia,—of hydrocele,—of Cæſarean ſection,—of the trepan, is no more than the drop of the bucket to the waters of the ocean. And it is juſt as poor logic to ſay, that after ſuch deſperate operations, theſe cavities are inflamed by the admiſſion of air, as it would be to ſay, when a man were run through the pericardium with a red hot poker, that the heart and pericardium were inflamed " by the admiſſion of air." Yet that nothing might be awanting to the abſurdity of this doctrine, this alſo is put down among the proofs, in ſober ſerious earneſt, according to the following quotation :

" The DANGER of the ADMISSION OF AIR to the CAVITY of the PERICARDIUM and SURFACE of the HEART, is PROVED by the following very ſingular caſe which *occurred* to me about SIX YEARS AGO : Two men in liquor diſputing about their ſkill in fencing, the one challenged the other to a match with pokers heated at the points, that there might be no miſtake about the hits, and his challenge was accepted. One of

them received a thruſt under the cartilage of the fourth rib of the right ſide, about a finger breadth from the edge of the ſternum, in a ſlanting direction inwards. He complained little till the third day after the accident, when ſymptoms of deep ſeated inflammation began to appear, and, notwithſtanding bleeding and other remedies, CONTINUED TO INCREASE. Theſe, on the tenth day THEREAFTER, when I was called to him, were ſucceeded by rigour and coldneſs of the extremities, with a ſmall, frequent, and intermitting pulſe; and two days THEREAFTER he died. On opening his body, a SLANTING paſſage was diſcovered on the outſide of the pleura, into the mediaſtinum and cavity of the pericardium, in which laſt, about five ounces of purulent matter were found. The internal part of the pericardium, and the whole ſurface of the heart were much inflamed; but there was no mark of injury done to the heart by the point of the poker; and it appeared to me EVIDENT, that the fatal ſymptoms had been *chiefly* produced by the AIR ENTERING the PERICARDIUM in the time of INSPIRATION *."

I believe, that in this caſe of a man wounded through the pericardium, with a poker "hiſſing hot," few people will be at any pains to ſeek for any ſuch out of the way explanation as that of air admitted through the pericardium; and eſpecially one muſt be much diverted with the notion of the air being drawn in at every reſpiration through a deep and ſlanting wound of the ſkin, muſcles, thorax, and pericardium.

* Monro's Burſæ Mucoſæ, page 41.

This misfortune of inflammation, running ſo quickly round all the ſurfaces of ſhut ſacs, wherever they happen to be wounded, proceeds altogether from another cauſe, ſimple and plain to the laſt degree. For, in the wound of any ſhut cavity where the parts do not adhere, the inflammation ſpreads and runs its courſe, by a law of the animal economy which we explain very ill, when we call adheſion the adheſive ſtage of inflammation, repreſenting, as the firſt ſtage of a moſt dangerous diſeaſe, that adheſion which is a natural and healthy action, the moſt natural in all the ſyſtem, and the fartheſt from diſeaſe. Thus, in a wound of the breaſt or belly, in a joint, or in any ſhut ſac, if the parts being nearly laid together, ſhould once adhere, then there is no ſwelling, no pain, no formation of matter, the parts are well and ſound in the very moment in which they adhere; thus it is ſometimes in narrow and ſlanting wounds. But if the wound be broad and open, or if the leaſt thing keep the lips apart from each other, or if they run into inflammation, then the lips part away from each other, matter forms, the wound inflames, and not the wound only, but alſo the wounded cavity inflames; ſo that if it be in a vital part the man dies. If there be a high inflammation excited in any cavity, be it the thorax and lungs, or be it the cavity of a vein, if the ſurfaces are kept away from each other, the inflammation may go on, and ſo prove fatal; but if the ſurfaces touch each other and adhere, the part is again ſound and entire.

DISCOURSE IV.

ON WOUNDS OF THE BELLY.

Yet here, in deſcribing wounds of the inteſtines, I have delivered but half the ſubject, I have ſtill to explain to you wounds of the liver, or of the ſpleen, of the kidney; of the meſenteric veſſels, or of the great abdominal veins,—which are indeed eaſily explained; for the inward bleeding, in all theſe wounds, is the greateſt danger;—and the bleeding may either be immediately fatal from mere loſs of blood, or the blood, exuding in leſſer quantities, lies clotted in the abdomen, is as a foreign body there; and thus, the inflammation, which is cauſed by the fæces in wounds of the inteſtine, is produced by blood, in wounds of the liver or ſpleen.

This enunciation of theſe wounds reduces whatever remains to be ſaid, to the moſt perfect ſimplicity;—divides them into two claſſes, the wounds with immediate bleeding, and the wounds followed by ſlow inflammation; and leaves but one thing to interrupt the ſubject, viz. the condition of the extravaſated

blood, how it lies in the belly, and by what accident it cauſes death.

If the liver or vena cava be ſhot, then there is a dreadful bleeding, which will be immediately fatal; for, after a ball has pierced the liver, the patient ſinks, as if the ball had abſolutely wounded the great vein itſelf: The patient feels little pain; he grows pale and cold; he ſwoons, from the inward loſs of blood; the belly fills with blood, becomes tenſe and hard; the man languiſhes in this coldneſs and fainting, for a day, and expires: Often, the blood begins to flow from the outward wound; and, whether you permit your patient to bleed thus outwardly, or cloſe the wound, that he may die a more lingering death, makes but a few hours of difference in a wound, which is ſo ſurely mortal. A wound of the ſpleen, liver, or vena cava, is as deadly as a wound of the heart, ſo full are they of blood.

But the blood may iſſue from the wound of ſome leſs important part; perhaps, it flows from a wound of the meſentery, from the veſſels of the ſtomach, or from a wound of the kidney, or of the emulgent vein. The flow of blood, from ſuch veſſels as theſe, is ſlow, and ſo far ſafe, being moderated by that reſiſtance and univerſal preſſure, which I have lately explained; the blood flows ſlowly; it is ſeldom ſuſpected or perceived; clots are formed about the bleeding veins; and the patient ſlumbers, without pain, or apprehenſion of pain, for many days. But the patient and ſurgeon are rouſed from this ſtate of eaſe and ſecurity, by ugly ſymptoms; for, on the fifth or ſixth day, the patient

becomes uneaſy, his belly ſwells; he begins to vomit; the dreadful pains come on, and the ſurgeon gives up all for loſt, without knowing any poſſible cauſe for theſe alarming ſymptoms. But if the ſurgeon be careful in examining the abdomen, and fix his attention where the patient complains of pain, he will find a tumor there, more diſtinct than could be expected from ſuch a cauſe.

The courſe of theſe ſymptoms is very eaſily explained. The patient ſlumbers in eaſe and ſafety for ſix days; till then, no tumor, no ſwelling, no pain, no one ſign of danger appears, becauſe the inward bleeding has reduced him to this low and ſlumbering ſtate, becauſe the blood runs into the abdomen warm and mild, and is not felt as a foreign body:—But the blood ſoon gathering into the form of craſſamentum and ſerum, the ſerum becomes acrid, the craſſamentum lies heavy among the bowels, like a hard cake,—the inflammation begins, and this tumor being felt on the fifth or ſixth day, the belly inflames on the eighth or ninth; on the tenth day the patient is in extreme danger:—There is the dreadful pain, the miſerere mei, on the eleventh or twelfth day, the patient, after all the ſigns of gangrene, expires.

Sometimes, the ſurgeon, notwithſtanding the confuſion and uncertainty of theſe ſigns, adventures to open the tumor, thruſt in his finger, and ſo diſcharge the blood; and, for his encouragement in this bold operation (where he has ſo much to anſwer for), there are caſes on record, where the ſurgeon has cut out two, three, or four pounds of black and coagulated blood,

and his patient (after an inciſion too of ſeveral inches long) has ſurvived;—and a ſurgeon, moreover, cuts with ſome degree of ſecurity; for the univerſal preſſure of all the bowels prevents the blood from going out wide into the cavity of the abdomen, and collects it into ſeparate clots and tumors of blood lying directly over the wounded veſſels, and ſupported by the turns of the inteſtines and meſentery, which are immediately below; the blood is not permitted to fall down into the pelvis, but is collected into clots at the wounded part; there, of courſe, the inciſions ought always to be made, by enlarging the wound itſelf.

I have hitherto dealt only in general principles, and have explained to you the two great dangers, the effuſion of the fæces into the cavity of the belly, and the effuſion of blood; the former a violent ſtimulus, exciting ſudden inflammation, the latter a ſlower ſtimulus, exciting inflammation, after an interval of many days of eaſe and quiet, often cutting off our patient, when we have no apprehenſion of danger. I ſhall refrain from detailing and explaining fully all the other points, which, however it might waſte your patience, never could exhauſt the ſubject. I ſhall rather try to ſum up the whole buſineſs in aphoriſms, reciting briefly the points which are already diſcuſſed, and adding, in ſhort rules, the doctrines of ſuch wounds as are not yet explained.

1ſt, WOUNDS of the LIVER are mortal; for conſidering the nature of this viſcus, how full it is of blood! the cor abdominale, as it has been called, how can there fail to be a profuſe bleeding? indeed, the wound

of the liver is, like the wound of a great vein. No doubt, a ball ſometimes paſſes through the thick ſubſtance of the liver, without cauſing immediate death; or, perhaps, the patient ſurvives, becauſe the great veſſels are not wounded; or becauſe the blood flows very ſlowly from them, and coagulates in the wound; perhaps, the bruiſing of the ſhot deadens the veſſels; or, perhaps, the ſwelling of a penetrating wound, in a ſubſtance ſo ſoft and ſpongy as the liver is, cloſes the ſides of the wound, ſo that the bleeding ſtops. However this be, we are ſure that patients have lived twenty days with wounds fairly acroſs the liver; and ſometimes, after wounds, where the liver muſt have been wounded more or leſs, the patient has recovered. Yet theſe are exceptions merely to this general rule: Wounds of the liver ſtill are to be declared mortal; there is a great inward bleeding, the patient immediately ſinks and faints, languiſhes in a ſlumbering ſtate, inſenſible almoſt, and without pain, lies cold and death-like, for perhaps twenty-four hours, and then expires.

2d. Wounds of the SPLEEN, or VENA CAVA, are alike fatal with thoſe of the LIVER, and the ſigns of internal bleeding, from any of theſe, are preciſely the ſame; and when a man dies, from the paſſing of a chariot-wheel over his body, or is killed in boxing, or after a great fall is taken up dead; or when a man has been ſtruck in the belly, and killed by a great ball, which has not wounded the ſkin, in all theſe (which I conſider as parallel caſes) the hurt is often found to be in the liver, vena cava, or ſpleen, or kid-

ney, any of which being burſt, pour out ſo much blood, that the patient dies.

3d, BLEEDINGS from wounds of the MESENTERY, —KIDNEY,—EMULGENT VEIN, or any ſmaller veſſel, are often ſlow and gentle, and are not known by the common ſigns of inward bleeding. The patient continues eaſy, and his belly ſoft, for ſome days, till the blood coagulating, either by the weight of its coagulum, or by the acrimony of its ſerum, excites inflammation; ſo that, on the ſixth day, there comes pain, ſwelling, hardneſs of the abdomen, quick pulſe, fever; at laſt the torments of the miſerere mei, and then gangrene, and death:—And here it may be noticed, that if there be immediate fainting on receiving the wound, and then coldneſs, accompanied with a continued faintneſs, ſwelling of the belly, and oppreſſed breathing for ſome days, moſt likely, there is blood, extravaſated, and in dangerous quantity, from ſome greater veſſel:—But if the patient have lain eaſy, and there comes pain, ſwelling, fever, and other threatening ſigns, on the ſixth or ſeventh day, with a tumor in one part of the belly, it is moſt likely a bloody tumor, which has begun to excite inflammation, and the blood muſt be cut out. If there be pain and ſwelling on the firſt or ſecond day, it is from wounded inteſtine;—if there be pain and ſwelling, but not till the ſixth day, it is from blood;—if there be no pain nor ſwelling, till after the fifteenth day, our patient is almoſt ſafe.

4th, The ſigns of a wounded ſtomach are a burning ſenſation at the pit of the ſtomach,—heat, thirſt, and a

feverish pulse, great irritability of the stomach, and vomiting so intense, whenever the mildest things are taken down, as to throw the whole frame almost into convulsions. These are the chief signs of a wounded stomach, together with bloody serum thrown up, and blood passing by stool; and in the end, extreme weakness, faintings, a low quick and fluttering pulse, swelling of the belly and hickup, and commonly death. Yet often during all this violence and straining continued for weeks, not one particle of food goes out into the belly; no doubt, it cannot always happen thus, but it often does.

5th, When the intestines are wounded, the escaping of the fæces declares but two well the nature of the wound; and too often there comes on an inflammation, not so limited, as merely to make the intestine adhere, but diffusing itself over all the belly, whence come knottings and adhesions of the intestines, swelling of the belly, fever, pain, the miserere mei, inward mortification, and death.

6th, Wounds of the bladder are always, or almost always, mortal; for the bladder both discharges its contents by its own contractile power, and lies very low in the pelvis: it throws out its urine into the cavity of the abdomen, which is a fluid so highly stimulating, that inflammation and mortification of the bowels are not long delayed.

7th, The wound of the gall-bladder is like this; for its fluid is stimulating in a still higher degree, and the patient very seldom escapes the quick and deadly inflammation; the urine or the bile act like poisons

thrown into the abdomen, the patient dying a moſt miſerable death.

Thus the prognoſtic of danger goes downwards, according to the ſucceſſion of parts; thoſe which are moſt important in the animal economy being affected in the higher wounds.

Wounds of the liver and ſpleen are deadly, from the inward bleeding, wounds of the ſtomach are hardly leſs mortal, for there is both a bleeding, from its numerous veſſels, and danger of its food being poured out into the abdomen; there is great danger of inflammation alſo from the mere wound. The wounds of inteſtines are leſs dangerous; for though the fæces are ſometimes poured out, ſo that the belly inflames, though the inflammation, which ſhould heal or unite the inteſtine, to the abdomen, often ſpreads over all the ſurfaces, yet they are ſafer than wounds of the ſtomach; for the inteſtines are quick in their inflammation, the peritoneum, by a wiſe proviſion of nature, is apt to inflame; there is, at ſuch a time, a ſort of ſympathy, like a contagion, among the contents of the belly, ſo that, towards whatever point this wounded inteſtine is turned, it meets with parts ready to inflame, and thus the wounds of the bowel and of the belly inoſculate, and the patient is ſaved.

The great inteſtines, lying lower in the abdomen, are leſs dangerous ſtill; they are bound down in their right place, they are behind the peritoneum, and they lie upon the thick fleſh of the lumbar muſcles, ſo that their wounds quickly heal. But ſtill it muſt not be forgotten, that though neither the liver, ſpleen, ſto-

mach, nor bowels are wounded, inflammation may come on merely from the hurt done to the peritoneum itſelf; after a wound of the belly the patient can never be without danger.

There is but one thing more relating to the prognoſtic, in theſe wounds, which you ſhould endeavour to remember, viz. that the ſtomach, by its ſinking, is apt to ſpill its contents into the belly. The inteſtines are leſs apt to do ſo, for they are held ſteadier in the abdomen; the urinary bladder diſcharges into the abdomen, becauſe it is emptied by its own contractile power; the gall-bladder muſt ſpill its contents when wounded, for there is nothing that can hinder the bile from flowing. The bile is the higheſt ſtimulus, the urine next, and the food and the fæces are leſs irritating, and the blood leaſt of all; and, perhaps, it is according to this order, that the dangers of theſe wounds ſhould be calculated, effuſions of bile being the moſt dangerous*, wounds of the urinary bladder next to theſe, wounds of the ſtomach and bowels come next in order, and effuſions of blood are the leaſt dangerous as a cauſe of inflammation, if only the bleeding be not ſo profuſe as to endanger life.

Laſtly, If the ball remain in the belly, though the patient eſcape through the firſt dangers, he is never

* I ſaw a man die in a very miſerable condition, who had, by a fall, torn the gall ducts, ſo that the abdomen ſwelled with dreadful pain: the moſt thorough jaundice I ever ſaw; and the abdomen, when opened, was full of bile, ſerum, and coagulable lymph,—the inteſtines univerſally turgid of a yellow colour,—univerſally inflamed,—adhering at ſome points, and gangrened in others.

ſafe; for the ball being lodged about the loins, in the heart of the muſcles, cauſes carious bones, fiſtulous ulcers, and running of matter, with a hectic fever, (which cannot ſtop while the ball remains), ſo that this is a very hopeleſs caſe †.

Now, before I lay down the few ſhort rules which relate to the practice, it is my duty to remind you, that we can do but little in the cure, nature herſelf cannot do much, we are as ſpectators merely, and every recovery is truly an eſcape.

Surgeons have boldly cut into the ſtomach, and extracted knives which had fallen down into it; foreign bodies of all kinds have made their way ſafely through its walls; ſoldiers have often recovered, whoſe ſtomachs had been ſo wounded with the ſabre, that the rice, or barley, or meat, which they had taken at laſt meal, has been caſt out through the wound; and the older ſurgeons tell us, that in broad wounds of the ſtomach, they had ſewed the wound together with many ſtitches, ſewing the wound of the ſtomach to the external wound. There are not wanting caſes, where the wound of the ſtomach having been prudently managed by the modern ſurgeon, the general preſſure has kept the ſtomach up to the wound, and adheſion has completed the cure; ſometimes wounds of the

† In opening the body of a young gentleman, who had been wounded in a duel, who had ſurvived his wound a whole year, lingering in a very ſickly condition, till at laſt he was cut off by a hectic fever; we found the ball (which had paſſed in at the groin) lodged under the pſoas muſcle, upon the inner ſurface of the haunch bone, and ſurrounded with many ſacs of pus.

liver have healed; and often the ſurgeon has cut out ſafely, very large collections of blood; the inteſtines have ſo often adhered, without the help of ſuch ſtitches, that, as I have ſaid, you find anuſes at the groin, and miraculous recoveries in every book; and read of cures, till you forget that there are dangers.

1ſt, Bleeding from the arm is the great preſervative againſt internal bleeding, and is the only means of preventing inflammation;—in every wound of the abdomen, you muſt bleed with a very liberal hand.

2d, Quietneſs, reſt, and opiates, with fomentations to the inflamed belly, are next in importance to bleeding; and the belly muſt be kept open with gentle glyſters, but never with laxative medicines, leſt they ſhould purge.

3d, The patient muſt very reſolutely refrain from all food, for ten or twelve days; for diet would ſupport the ſtrength, encourage the inflammation, and diſturb the wound by a flux of fæces, which might, perhaps be thrown out into the cavity of the abdomen itſelf. The patient muſt refrain from food, then, that the inteſtines may not be moved. He muſt be nouriſhed with glyſters; or if he takes any thing by the mouth, let it be ſome jelly or ſoup, which, though it were to go out into the abdomen, might be abſorbed.

4th, If the wound be in the belly merely, and a ſound inteſtine be forced out, you muſt put it back gently with the fingers, and ſtitch the outward wound.

5th, When there is a wounded inteſtine which you are warned of only by the paſſing out of the fæces, you muſt not pretend to ſearch for it, nor put in your

finger, nor expect to ſew it to the wound; but you may truſt that the univerſal preſſure which prevents great effuſion of blood, and collects the blood into one place; that very preſſure which always cauſes the wounded bowel and no other to protrude, will make the two wounds, the outward wound, and the inward wound of the inteſtine oppoſe each other, point to point; and if all be kept thus quiet, though but for one day, ſo lively is the tendency to inflame, that that adheſion will be begun which is to ſave the patient's life*.

6th, If indeed you have a wounded inteſtine fairly in your hand, protruding and plainly wounded, it were madneſs to let it go back into the abdomen, where there cannot but be ſome danger of the fæces getting out. But do not ſew the bowel with a long ſuture, in hopes of cloſing the breach, nor follow the ſtrange and whimſical inventions of cylinders of paper or of iſinglaſs, which it is eaſier to uſe in experiments upon dogs, than to practice in real wounds. You muſt make but one ſingle ſtitch, and ſew the wounded inteſtine to the outward wound,—there the gut will adhere, throw out its fæces for ſome time, and then heal, the outward and the inward wound uniting in one knot or ſcar.

7th, If a ſound bowel have come through a narrow wound, and be inflamed and ſo turgid, that you can-

* In Mr. Hunter's book on gun-ſhot wounds, there is a caſe of a gentleman, who, having been ſhot through the belly in a duel, died in thirty-ſix hours; and it was found upon diſſection, that, even in that very ſhort period of a day and a half, the adheſions had formed.

not puſh it back, you muſt not think of pricking it with a needle or an awl, as was the cuſtom of Parée, Dionis, and all the older ſurgeons; you muſt perform the operation for hernia by ſlipping in your finger to guide the knife, opening the wound a little wider, till the inteſtine is free, and then ſtitching the outward wound after the inteſtine is put back.

You muſt take all poſſible pains, both about the ſurgery of the wound, and in keeping down the actions of the ſyſtem; for you perceive that there are ſuch chances as make every caſe intereſting and none deſperate.

If my reader ſhould wiſh to know ſomething more than theſe general principles, or ſhould deſire (as we commonly expreſs it), to be more minutely informed, about particular wounds of certain parts contained within the cavity of the abdomen, &c. he may read Mr. Benjamin Bell's chapters upon Wounds of the Inteſtines, Wounds of the Stomach," &c. and he may read that chapter upon Wounds of the Uterus, which begins with theſe words, "THE UTERUS IS A STRONG MUSCULAR BAG PECULIAR TO THE FEMALE SEX, BEING SOLELY INTENDED FOR THE FOETUS."

APPENDIX TO DISCOURSE IV.

ON THE MANNER OF STITCHING AN INTESTINE.

I HAVE endeavoured to repreſent the real condition of a wounded bowel, and the eaſy cure of it, in that ſimple form in which I have conceived it. I have adviſed that one ſingle ſtitch only ſhould be ſtruck through the wounded bowel, and then drawn alſo through the wound. And I have ventured, moreover, to ſay, that if there be in all ſurgery a work of ſupererogation, it is this operation of ſewing up a wounded gut. The mechanical and vulgar conceptions of thoſe who believe that a wounded inteſtine is cloſed, not by inflammation and the adheſion of contiguous parts, appears to me offenſive to a degree which I ſhall hardly venture to expreſs to you. But it ſtrikes deeper and wider than this; it is not offenſive only, it is dangerous: for while I take an intereſt, and find only a pleaſant labour in teaching the young ſurgeon what is right to do, and what is conſiſtent with the ſimple ways of nature, and the economy of the living body, he is ſeduced by a formal account of moſt curious and ingenious methods of ſewing a gut, and is drawn aſide

to follow after ſuch puerile conceits, thinking to do more than even nature can do in ſuch a caſe. He reads in the ſyſtem of a celebrated author, that "their opinion is ill founded who would rather truſt to nature for the cure of a ſmall opening in the gut, than to inſert a ligature, inſomuch (ſays the author) that I would not leave even the ſmalleſt opening that could admit either chyle or fæces to paſs without STITCHING it up."

Theſe things cannot be left unſettled, without danger; they cannot be explained, without explaining and refuting alſo, wherever it is required, the opinions of authors; and again, it is impoſſible to explain thoſe things, without allowing ſuch expreſſions to eſcape, as are often more dangerous to the man who uſes them, than to the man who ſuffers them; and which no generous mind can think of uſing without regret: yet, what ſhall we ſay of a man, who adventures to write on a learned profeſſion, while he is himſelf totally ignorant; who writes boldly through the whole circle of the human body; of wounds which he has never ſeen, and of viſcera which he has never handled; who ſupplies his want of knowledge by bold conjectures only; who tells us, "that when the ſpleen is laid bare by a wound, it is eaſily diſcovered, whether it is wounded or not; that a diviſion (i. e. a wound) of the duct of the pancreas will, by interrupting or impeding digeſtion, do much injury to the conſtitution; and as the liquor *will* be effuſed into the cavity of the abdomen, it may thus *be productive* of *collections*, the *removal* of which may require the ULTIMATE aſſiſtance of ſurgery: That wounds of the receptaculum chyli

will be diſtinguiſhed by the diſcharge of a milky liquor, and that they can never become the OBJECTS of ſurgery; but by producing collections in the abdomen, which may require to be DISCHARGED: That the diſcharge from the receptaculum chyli is altogether white like chyle, or mixed with a conſiderable portion of it; and that the patient becomes daily weaker THAN he OUGHT TO DO from a wound of the ſame ſize in any other part, owing to the nutritive part of the food being carried off before any advantage is derived from it *?" Who tells us, concerning the meſentery, "That in its wounds the diſcharge of *chyle* or blood into the cavity of the abdomen, is what we have moſt to dread; and that whenever any portion of the meſentery is PROTRUDED, it ſhould be examined with ACCURACY;—and whenever any of its veſſels are found to be divided, they ſhould be TIED with LIGATURES," &c.? As for "wounds of the liver, they are apt, we are told, to prove particularly hazardous, from their allowing the bile, which is very SOON RENDERED PUTRID, to be poured into the cavity of the abdomen." "And wounds

* "With a view, ſays the author, to prevent the diameter of the canal from being diſtended, which, at the ſame time, will leſſen the extent of the wound, the patient ſhould be kept upon a very ſpare and cooling diet.—Any food, which he takes, ſhould be not at regular meals," &c. &c. Is not the accuracy and carefulneſs of obſervations, ſuch as theſe, eſpecially meritorious, ſince they are all concerning things which the author has never ſeen,—never heard,—never read of,---cannot underſtand? Since this ſame receptaculum chyli is nothing, it is only a name which the older anatomiſts uſed, before they knew the part rightly; and now they find, that there is no ſuch thing as a receptaculum, or bag.

of the gall-bladder are more dangerous, only as they are MORE CERTAINLY *productive* of EXTRAVASATIONS of bile into the abdomen."

These observations are unparalleled in all the books of surgery, from the invention of printing down to this present day. The author talks of the splcen laid bare, as if it were some fixed viscus, or one which could be seen, while it absolutely lies among the deepest in the abdomen, and cannot be drawn out into view, even in the dissection of a dead body, without thrusting down the hand for it; he talks of the pancreas as if it could be hurt without a most complicated and absolutely fatal wound; of the thoracic duct, as if it could be injured without a wound of the aorta, heart, or spinal marrow; and of the receptaculum chyli as if it were a part really existing, while it is merely a name, used ignorantly by the older anatomists, and forgotten now; and, he not only describes how the patient survives such wounds, but how gradually he wastes, and what means the surgeon is to use for his recovery: he talks as if the pancreatic duct could fill the abdomen with its saliva, or as if the thoracic duct could fill it with chyle; as if the mesentery could really protrude by itself; or as if the liver, as well as the gall bladder, gave out bile. These things lying all now before me, all in one single chapter, have inclined me, most uncharitably, to call it a curious specimen of the art and mystery of writing surgery (and anatomy to boot) by conjecture and mere guess; these grosser faults have, at least, weaned me thoroughly from that kind of prepossession, which some people indulge in

favour of every thing that is in print; and this, in its turn, will enable me to ſpeak confidently about the remaining errors in this chapter, upon wounds of the viſcera; for once more I affirm, that it is impoſſible for the young ſurgeon to receive willingly, or to follow confidently, this ſimple method of ſewing an inteſtine, which I commend, while other methods appearing to him more curious, more ingenious, or more ſecure, are left unrefuted.

This author firſt directs us to learn what is, according to his ſyſtem, a thing very eſſentially neceſſary to be known, viz. which is the upper, and which is the lower end of the gut:—"For it is neceſſary, in reuniting the inteſtines, to know which is the upper end; but it requires ſome attention to make the diſtinction. The periſtaltic motion will be obſerved to be more remarkable in the upper DIVISION than in the under. But the moſt certain method is, to obſerve at which of the ends the fæces or chyle are evacuated," &c. &c.

There are ſome little things wanting in this explanation; for the author ſhould have told us, in the firſt place, how much of each end of the inteſtine muſt be hanging out in this eaſy negligent faſhion, before we can compare the periſtaltic motion of the upper end with that of the lower; muſt we learn to know, at one glance of the eye, whether the periſtaltic motion be faſt or ſlow? and whether it be ſuch as belongs to the upper end of the inteſtine? how or in what animals, and by what kind of experiments, ſhall we learn this? has this author ever ſeen the periſtaltic motion thus regular? has he ever ſeen chyle, ſo that he could ſwear

to it, that it was chyle? can he pronounce, from which hand the fæces and flatus come in an accidental anus at the groin? Now, my reaſon for aſking theſe queſtions, is a very humble one, viz. that I never ſaw chyle in the inteſtines (in the delicate veſſels, the lacteals, indeed, it is eaſily ſeen). I have hardly ſeen this periſtaltic motion, even in animals, when opened on purpoſe, and poſitively never in the human body; and when I have chanced to ſee an anus at the groin, I never could diſtinguiſh, whether the fæces and froth, and flatus, which iſſued from it, came from the right hand or from the left; they came from the general opening.

However, it muſt be acknowledged, that this author really has good reaſon to be careful about this matter; for his operation, which proceeds upon it, is a very deſperate one: He adviſes the ſurgeon to ſeek out the upper end of the inteſtine, or the end that may be wanting, not only by putting in his fingers, but by cutting up the wound! "I am clear," ſays he, "however that this (viz. the putting one ſtitch into the end of a wounded inteſtine, ſo as to hold it in contact with the outward wound) will not prove ſatisfactory to the feelings of any practitioner, poſſeſſed of that degree of fortitude which our art requires, and who has that regard for the ſafety of his patient, which every ſurgeon ought to poſſeſs. And, although I have adviſed, in wounds of the inteſtines, when no part of them protrude, where we cannot, therefore, know whether the wound be large, or only a ſmall puncture, and where the injured part may be

ſo ſituated, that it could not be reached, without opening the GREATEST PART of the ABDOMEN, and turning out PERHAPS the whole alimentary canal, that we had better allow the patient to have the chance of recovering, without any attempt to make a diſcovery, and which he may do if the wound is ſmall, than to propoſe a meaſure, which, of itſelf, might be attended with more hazard than the injury for which it was meant to be a remedy; yet, when we are rendered certain of the gut being completely divided by one end of it hanging out of the wound, as this will give much cauſe to imagine, that the other is at no great diſtance, I think it ought, by all means, to be ſearched for, by enlarging the external wound, ſo as to admit of the fingers of the operator being freely inſerted. Even where the upper part of the gut is protruded, it is worth while to ſubmit to this inquiry, merely in order to have at leaſt ſome chance of avoiding the loathſome inconvenience of an artificial opening for the fæces: And, where the upper part of the gut has ſlipped in, the patient can have no chance for farther exiſtence, if it be not diſcovered. In ſuch a ſituation, therefore, we ſhould not heſitate as to the meaſures." —I will not, as I have formerly profeſſed, quarrel with this author about many trifling faults, which I rather chooſe that my reader ſhould have all the merit of diſcovering, without being beholden to me; but I cannot refrain from ſaying, that this is not the prudent way of addreſſing young men, who are but too apt to do adventurous things upon ſlight authority. But this is not all; other curious improvements follow

cloſe upon the heels of this important diſcovery; for, as ſoon as the ſurgeon has found out the upper end of the gut, he is to thruſt the upper end of the gut within the lower end, an inch or two, juſt as he would puſh in the ſliding end of an opera-glaſs; and that the ends may go neatly within each other, a roll of iſinglaſs or tallow is to be put into the gut; and that they may remain unmoved for ſome time, they are to be well and ſoundly ſewed with a good needle and thread all round. Indeed, to read this, any ſenſible man muſt believe, that I ſpoke in mere ridicule, and deſcribed this firm ſewing of the gut diſhoneſtly; but I ſhall, as uſual, give the quotation,—let the author ſpeak for himſelf:—"In this ſituation, it would be difficult to draw the divided parts together with a needle and ligature, without hurting the oppoſite ſides of the gut, in any other way than by keeping it extended by means of ſome round body inſerted into it. For this purpoſe, it has been propoſed to make uſe of a tube of thin paſteboard or paper; but as this might be laid hold of, and kept firm by the ligature, a ſmall roll of tallow is preferable, as it will afterwards melt and paſs eaſily off with the fæces. A piece of it, nearly equal to the diameter of the inteſtine, ſhould be inſerted into the end of the upper portion of the gut, and, being afterwards paſſed into the other, ſo as to carry the one to the extent of an inch, or thereby, fairly into the other, the two portions ſhould now be STITCHED together with a ſmall needle, armed with a fine thread. The ſtitches ſhould be carried COMPLETELY ROUND the gut; and, in order to give them as great

a chance as poſſible of ſucceeding, they MIGHT EVEN go TWICE ROUND! firſt, at the edge of the under portion of gut! and afterwards about an inch beneath, near to where the upper part of it terminates!"

From all which it is very plain, that the mechanical notions of this author are utterly incorrect; that he has no conception how a gut adheres, nor how that adheſion may be aſſiſted by a ſingle ſtitch, nor how impoſſible it muſt be for a gut to adhere, or to do any thing indeed but mortify, by being ſtitched all round, and ſtitched even with a double row. That a man, who has no conception of a gut being ſure in any other way than by the firmneſs of his own ſtitches, ſhould propoſe a double row of ſtitches, is not wonderful; he ſhould juſt have put a binding round it, and ſo finiſhed this admirable operation.

Now, I do affirm, that the carefulneſs, and apparent accuracy of all this, has irreſiſtible weight with a ſtudent, eſpecially when enforced and repeated in every different form; while, in fact, this way of diſtinguiſhing the upper from the lower end of a gut,—this thruſting of the fingers into the belly, this cutting up of the wound, in order to grope for that end of the gut which is wanting, this ſewing it upon a cuſhion of tallow, and the ſewing it faſt and firm with a double ſeam, is, like the reſt of the chapter, delivered upon conjecture merely; it is an untried experiment as yet, and let it be tried when it may, I ſhall venture to predict, that it will turn out a very ſad one *.

* This author adds one more ſpeculative direction, which is of the moſt ſingular nature, and has, as far as I know, all the merit that ori-

I ſhall now return, then, to repreſent once more the ſimple mechaniſm of this caſe. As for inteſtines cut fairly acroſs in all their circle, I believe the thing cannot happen, and that this, like the reſt, is a piece of mere gueſs work: for, if I know any thing about the way, in which the viſcera are diſpoſed within the belly, it muſt happen, that a ſabre which cuts one piece of inteſtine fairly acroſs, muſt have cut many other turns half through; and in ſhort, that a ſabre

ginalty can give it, that is, having ſewed the gut tightly, which he never fails to do, he adviſes, in the following paſſage, that the ligatures be cut off, and the gut with the ſeam in it, and the thread be thruſt back into the abdomen, and no more ſaid about it. "In this manner, ſays he, the ſides of the wound may be drawn cloſely and exactly together, without leſſening the diameter of the gut in any degree; and the end of the ligature may at laſt be ſecured, and cut off cloſe to the other extremity of the wound, if the gut is to be put freely into the abdomen, or it may be left of a ſufficient length to hang out at the wound in the teguments, if it is the meaning of the operator to retain the wounded part of the inteſtine in contact with the external opening. This indeed is uſually done, that we may have it in our power, as it is ſaid, to draw away the ligature, on the wound of the gut being cured. It is probable, however, whatever future may be employed, if more than one or two ſtitches have been paſſed, that it will be very difficult, and even uncertain, our getting the ligature away, without hurting the inteſtines, more than we ought to do. I would never adviſe, therefore, with any view of this kind, that the ligature ſhould be left out at the wound; leſs danger will ariſe from cutting it entirely away, and allowing the ſtitches to remain. A conſiderable part of it will fall into the cavity of the gut; and in ſuch circumſtances, the danger of the patient, from other cauſes, is ſo great that any additional riſk, that can occur from the remaining part of it, muſt be ſo trifling, as not to deſerve notice."

Benjamin Bell's Syſtem of Surgery.

cannot cut a piece of inteſtine acroſs, unleſs the ſtroke have cut up much of the belly, ſo much, that whether you finiſh with a double row of ſtitches, or whether you uſe or neglect the elegant invention of the roll of tallow is a matter of very little importance; but only that you had juſt as well ſpare yourſelf the trouble, and let the poor man alone.

The wound, ſlit-like in one ſide of inteſtine, is the thing which chiefly you have to do with. I have ſhown already, that ſuch a wound is to be cured, not by the edges of the wound adhering to each other, for they are like mere mathematical lines, having no breadth of ſurface and no broad contact; the lips of ſuch a wound are healed, not by adhering to each other alone, but by adhering at once to each other, and to the inner ſurface of the abdomen. I have proved by reaſoning, that the ſurrounding parts of the abdomen are at ſuch time highly ſenſible, much inclined to inflame, and ready to unite with them; and I have confirmed this, by ſhowing, that in one ſingular example, five deſperate wounds in one perſon healed: and there each wounded inteſtine adhered to ſome part of the peritoneum, or ſome other piece of gut in various ways. I have thus proved, that the mere preſſure upon the viſcera will keep the wounded gut ſo cloſe to the peritoneum, as to make it unite. But ſince it is plain, that the outward wound is the part of the abdominal ſurface, the beſt inclined to ſympathize and adhere with the wounded inteſtine, our duty plainly is, to make one ſimple ſtitch very ſlightly through the edges of the wounded inteſtine, not with the abſurd

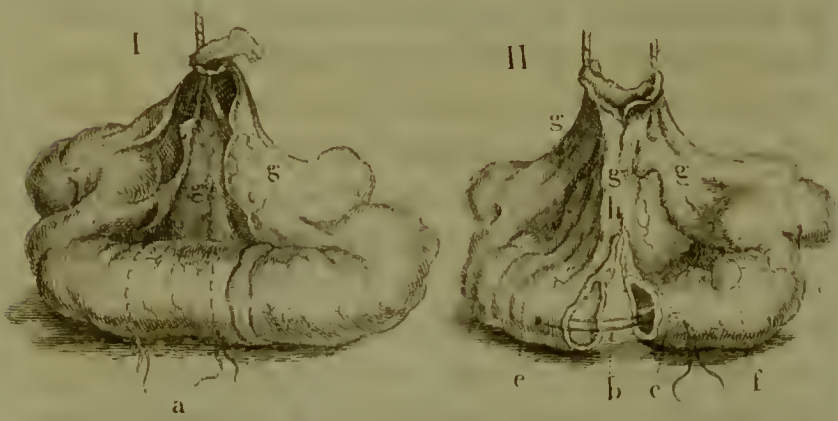
intention of ſewing up the breach in the inteſtine firmly with a needle and thread, but merely to keep the inward wound of the inteſtine neatly and cloſely in contact with the outward wound, when it will adhere,—will continue perhaps open, and throwing out its fæces for ſome time, but will contract gradually as the outward wound contracts, and will cloſe effectually and ſoundly before the outward wound heals.

But if it ſhould happen that a gut is cut fairly acroſs in all its circle, which it is not impoſſible, but it may be, by a ſtab with a knife or broad ſword, the mechaniſm of the caſe is this: the meſentery ſtill has its hold upon each end of the divided inteſtine; and the two ends of the inteſtine can never be far ſeparated from each other; nor can the one end be introduced ſo far within the other as to make the double row of ſtitches round and round, the one row diſtant from the other an inch. It is not by this thorough ſtitching that ſuch a gut is to become ſound; it is only by adheſions, and by two adheſions taking place at the ſame moment. The two ends of the gut may be made to adhere to each other; and the prudent way of favouring theſe adheſions is to introduce the one piece of inteſtine a little way within the other, and make one ſingle ſmall ſtitch in that part of the circle which is fartheſt from the meſentery, and then draw the gut by means of that thread cloſe up to the wound, and thus it will probably happen, that the meſentery will keep its ſide of the circle firm, that the ſtitch will keep the oppoſite ſide firm, that the gut being drawn by the thread, and puſhed from be-

hind, and flattened by the univerſal preſſure within the abdomen, the double adheſion may take place, viz. of the ſurfaces of the inteſtine to each other, and of the wound of the inteſtine to that part of the inner ſurface of the belly where it is open and inflamed by the outward wound.

Whether I have explained this ſimple proceſs rightly, will be beſt judged of by thoſe who are the beſt acquainted with the facts of ſurgery, as they now ſtand; and the method which is here propoſed muſt be authenticated or refuted by future obſervations. But, on the other hand, it is very eaſy to foreſee, that if this which I have deſcribed ſhould really be the proceſs of nature, the ſtitching of an inteſtine round and round cuts off at once all hopes of adheſion. How the inteſtine can diſcharge the threads of this complicated ſuture without total ſuppuration and deſtruction, or rather how it can eſcape a total and immediate gangrene, I leave to be explained by thoſe who have been at ſo much pains to explain all the reſt; for there remains but one thing for me to do, viz. to make ſure of my reader's having a correct idea of theſe two doctrines, by putting them down oppoſite to each other in the form of plans Fig. 1ſt, explains the double ſuture; fig. 2d, explains the ſimple ſtitch; (a) points out the ſpace which muſt mortify, according to the DOUBLE SEAM METHOD; (b) ſhows the ſingle ſtitch by which we hold the two pieces of gut tight with regard to each other, and both cloſe up to the wound; (c) the dotted line, marks the direction in which the gut (e) lies within the gut (f); (g) ſhows

the meſentery ; (h) the way in which it keeps the two ends of the divided inteſtine right ; and it cannot be difficult to conceive how the ſtitch (b) will come eaſily away with little harm to the inteſtine, and not till after it has done its buſineſs effectually in uniting the inward to the outward wound ; ſo that though the breach which the ſtitch left were large, ſtill the fæces would be diſcharged eaſily, and it would heal gradually along with the outward wound.



DISCOURSE V.

ON WOUNDS OF THE HEAD.

"WHILE the bones in general ſerve as a baſis for the ſoft parts, and for ſupporting and directing the motions of the body; certain bones have a higher uſe in containing thoſe organs whoſe offices are the moſt eſſential to life. The ſkull defends the brain; the ribs and ſternum defend the heart and lungs; the ſpine contains that prolongation of the brain, which gives out nerves to all the body: and the injuries of each of theſe are important in proportion to the value of thoſe parts which they contain." In wounds of the head, it is not the deſtruction of the ſcalp merely that diſturbs us, nor the wound of the bone, though that of courſe makes a tedious diſeaſe; it is the injury of the brain alone that is dangerous; and the brain is hurt, ſometimes, by the general ſhock, by the oppreſſion of inward bleedings, or by depreſſion of the ſkull, and very often, ſo cloſe is the connection and ſympathy of all the external and internal parts, it is hurt by the very ſlighteſt injury of the ſcalp or bone. Thus it comes to be a very natural arrangement to explain to

you, firſt the indirect injuries of the brain, to explain how the hurts of the ſcalp or of the ſkull itſelf affect the brain indirectly; and, ſecondly, how, by concuſſion, or any other immediate injury, there is a direct affection of the brain.

OF SECONDARY AFFECTIONS OF THE BRAIN.

I ſhall firſt try to explain to you, in the way of a general doctrine, how careful you ſhould be of all kinds of wounds, and how watchful of the ſlighteſt bruiſes, how ſparing in your inciſions, and how reſerved in your operations of trepanning the ſkull, cutting the dura matter, or cutting away fractured bones; for there is an economy in theſe things, which, in the hands of a ſkilful man, often ſaves the patient; the want of which was a chief blemiſh in the practice of older ſurgeons.

It is as a general doctrine, (but not as a mere theory), that I would explain to you the intimate connection and ſympathy betwixt the integuments and ſkull, and through that with the brain. It is a doctrine which ſhould guide you not only in the ſlighteſt wounds, but in every ſtep of your boldeſt operation. You muſt not hold off the edges of the wounded ſcalp from each other, for they will inflame and ſuppurate with loſs of ſubſtance; you muſt not keep the wound open, leſt that ſhould hurt the bone; you muſt not trepan too much, leſt you hurt the dura mater; you muſt not open the dura mater on ſlight occaſions, leſt there come a protruſion of the brain; for the brain is expoſed, and the

balance and ſupport to it is loſt whenever you take away too much bone: The ſkin, the ſkull, the dura mater, are equally integuments of the brain; they ſhould be each more reſpected, as they are cloſer to the brain; and none of them ſhould be wantonly injured, becauſe they have all a cloſe relation to each other, and the moſt diſtant has its connection with the brain; and none of them ſhould be raſhly taken away, for it is a loſs which never can be repaired. By ſaving the ſcalp, you prevent exfoliation, and a plug is ſometimes formed to replace the part of the ſkull; but where neither the ſcalp nor the ſkull are ſpared, the inflammations of the membranes, the ſloughings from the dura mater, and the protruſions of the brain, are ſuch as to cauſe long ſuffering, and an imperfect cure in thoſe few who eſcape after this kind of ſurgery.

The range of this, as of every true doctrine, is of great extent, and the comparative view which it ſuggeſts of the ancient and modern ſurgery, as it relates to this point, is not uninſtructive.

No ſooner was a drunken fellow, who had been revelling in the ſtreets, carried with his head broken to any great hoſpital, than he was ſcalped; and, as Mr. Deaſe tells us ſeriouſly, they had him all ready by the morning viſit for any thing which might need to be done;—he was ſcalped in the evening,—his fractured bone was ſcraped and examined in the morning,—and in the courſe of twelve hours, without knowing who he was, or what he was, or how wounded, or almoſt whether he was ill or not! If there was

but a ſlight fracture on the head, he was trepanned: and if, during this ſhort proceſs he chanced to awake, he found himſelf ſtruggling among a ſet of good ſturdy aſſiſtants, who were leſs curious about underſtanding what he might have to ſay in his own defence, than in keeping him firm down upon the table, and occaſionally cramming his mouth with a handkerchief when they thought he roared too loud.

It is but a few years ago that theſe practices prevailed: the ſurgeon cut off every piece of ſcalp that was hurt, or cut even with a clean inciſion. If he performed the operation of the trepan, he thruſt in ſyndons into the hole, leſt it ſhould heal, for then it was their rule that the ſurgeon ſhould not incarn the wound till after forty or fifty days, in ſhort, till all the looſe pieces and the trepanned circle of bone ſhould have exfoliated and come away. By their cutting away the ſcalp, by their large trepannings, which they boaſted of as their greateſt work, by their ſcraping with trepan irons, to haſten the exfoliation, and by their anxiety about procuring a due concoction of matter, by their maſterly attempts at exfoliating the bone, which they performed chiefly with red hot irons, and the unavoidable delays of making new openings and cutting off the fungous excreſcences, they made a very tedious buſineſs even of the ſlighteſt caſe.

It is no wonder, that ſurgeons, who were thus afraid of cloſing the wound till the bone had exfoliated, were much averſe from ſewing the ſcalp; but you know, from what I have formerly explained to you in deſcribing ſabre wounds, how ſafe it is to lay down the

wounded ſcalp, how ſafe to ſettle it with ſtitches,—how eaſy to cut theſe ſtitches out if the ſcalp do not adhere, how ſoon all danger vaniſhes, and yet the danger is not ſlight, as you may eaſily be able to conceive from the compariſon of the old with modern practice. For the ſcalp being either held off from the ſkull, or being entirely cut away, left the bone naked; the exfoliation required ſix, eight, or ten months, more or leſs, according to the circumſtances of the caſe; and during all that time the patient was upon the brink of danger: The dura mater was always liable to fall into diſeaſe even during the firſt ſtage, i. e. during the exfoliation of the bone; when the bone exfoliated, the brain, or at leaſt the dura mater was laid bare, with a degree of danger exactly proportioned to the loſs of bone:—The leaſt accident was apt to hurt the part,—the leaſt irregularity inflamed the brain,—a conſtitutional diſeaſe, or even the bad health, proceeding from confinement, the air of an hoſpital, the ſlighteſt error in the dreſſing, was apt to corrupt the membranes, and produce fungi, and retard the healing of the ſore: many a change did ſuch a ſore ſuffer during the tedious cure, and every riſing of the pulſe, every ſlight headach, every change upon the wound, alarmed the ſurgeon; it is eaſy to conceive what numbers died, how difficultly and how imperfectly a few were cured, how critical the ſituation which a patient was often brought into by a wounded ſcalp.

A modern ſurgeon is very careful of the ſcalp, and knows, by much experience, that there ariſes, often from the ſlighteſt wound, the greateſt dangers. Though

the ſcalp be lacerated and thrown back, and even though the ſkull be cut up along with the ſcalp, he cleans it of blood, lays it down ſmoothly, and expects it to adhere. Though, in a narrow wound, he puts in his finger, and feels the cranium bare, though he puts in his probe, and knows that the ſkull is naked to a great extent, ſtill he lays down the ſcalp carefully, and preſſes it gently, that it may adhere. If, in a young man or boy, there be a clean cut, he is ſure that it will adhere; if the ſcalp be wounded by a fall, or by a brick, ſtone, poker, or any weapon which at once cuts and bruiſes, he is doubtful whether it will adhere; in a wound made with a club, or bludgeon, or in a gun-ſhot wound, he knows that there is a deſtruction of parts and loſs of ſubſtance, and he knows that there can be no immediate adheſion in ſuch a wound;—yet he does not entirely deſpair, but preſerves the ſcalp, hoping, in the end, and after ſuppuration is well eſtabliſhed, to put down the ſcalp, and keep the bone ſound.

There are, no doubt, diſappointments alſo in this ſafer practice, of putting down the ſcalp; but although the ſcalp do not adhere on the firſt or ſecond day, although the head inflame, and the ſcalp ſwell with eryſipelas, ſo as abſolutely to inflate the whole face, and cloſe the eyes, the ſurgeon is but little alarmed; he knows that this kind of ſwelling really belongs to the ſcalp, and betokens nothing wrong within; he very compoſedly cuts out his ſtitches, lets the ſwelling ſubſide, then lays the ſcalp down again, and thus after ſome accidents and interruptions, after-ſwellings,

ſuppurations, ſlight fever, burſtings of the ſtitches, he, by a prudent perſeverance, makes good his point; re-uniting in the end a ſound flap to a healthy bone. Thence it is plain, that there is no wound abſolutely ſafe: the ſlighteſt wound of the ſcalp may occaſion danger; but it is only when it does not adhere, that there is real danger; the moment that it adheres all is ſafe.

You will now underſtand, that by SECONDARY AFFECTIONS of the BRAIN, I mean all thoſe which ariſe not from any immediate oppreſſion, which do not appear at the time of the wound or blow, which make their ſlow inſidious progreſs in the form of diſeaſe; in which the ſcalp or perioſteum of the ſkull is firſt injured, which injury is followed, after a deceitful interval, with this ſecondary affection of the brain;—ſlow inflammation is the cauſe of all the miſchief, and we muſt not wonder at its ſlowneſs; for the ſkull is as a wall betwixt the external and internal parts, and it is only after corrupting the ſkull, that inflammation of the ſcalp can affect the brain; and if it be true of a clean cut, it is much more true, that after a blow with a club, or any heavy body, there often lurks under the ſlighteſt wound the moſt imminent danger.

A man who is knocked down with a club, becomes ſick, faint, revives very ſlowly, but at laſt recovers almoſt perfect health; he is able to go about, and feels as if in perfect health, or, if indiſpoſed, it is in ſo ſlight a way that he hardly knows what ails him, nor even apprehends the ſmalleſt danger;—but, after this interval of deceitful eaſe, laſting ſometimes for weeks

he again becomes, as at firſt, ſick and faint; his knees bend under him, his hands tremble; when he puts out his tongue, it trembles, as in a nervous fever; there is a continual loathing of food, and he vomits at times. Then comes on an evening fever, a furred tongue, a quick and fretful pulſe, fluſhings of the face; the eyes are red and turgid; there is a corded feeling, with weight and pain of the head, wildneſs or timidity in the aſpect, and occaſional delirium during the night, which imports the greateſt danger. Now, there exiſts, in fact, a ſecondary inflammation of the brain; ſometimes, there comes on a dreadful delirium, and the patient can hardly be kept in bed; he ſtruggles with maniacal ſtrength, foams at the mouth, ſweats with the violent ſtruggling, till, being quite exhauſted, he ſinks into paralyſis or ſtupor, and then dies. But more frequently it happens, that, inſtead of this high and raging delirium, he is gradually more and more oppreſſed, ſo that, ſtill even in this laſt ſtage, it is a ſlow inſidious diſeaſe, and in place of this delirious ſtate, the ſickneſs increaſes with lowneſs and languor; he has a low delirium, and is not eaſily rouſed; if allowed to lie, he is ſunk in this ſtupor, if rouſed, he is ſlightly delirious, and raves; while he is ſinking again, it is with a low and muttering delirium; and, after continuing many days in this condition, he falls into paralyſis, is ſometimes convulſed, voids his fæces and urine inſenſibly, and dies.

The trepan is, in this caſe, almoſt a hopeleſs operation, and yet it is to be tried; for theſe are the ſigns, though uncertain ones, of matter collecting upon the

brain. The ſhiverings and quickneſs of pulſe are the ſigns of matter forming; the ſlight vomitings, delirium, and palſy, are the ſigns of its oppreſſing the brain: It is plainly an abſceſs of the brain; and as it is an abſceſs which cannot burſt nor relieve itſelf, though the trepan may fail to relieve the patient, yet, without that help, he is infallibly dead. No man need be aſhamed to have believed, that there was matter, or to have trepanned on account of it, when there was none; for what part is there in the body where the ſurgeon has not made his openings in ſearch of matter, and has been deceived?—Or, why ſhould we be aſhamed, when we are deceived by ſymptoms ſo irregular, and ſo alarming too, as thoſe of a diſordered brain?

But of all the ſymptoms which mark this diſorder of the brain, the nature of that tumor, which ariſes over the diſeaſed part, is the moſt abſolute and deciſive ſign: For when the ſcalp only is concerned, the inflammation and tumor are of the eryſipelatous kind; when there is blood poured out from any artery of the ſcalp, it makes a ſoft and fluctuating tumor; but when there is a diſeaſed ſkull, or dura mater, the tumor is ſmall, ſoft, puffy, regularly circumſcribed, and ſeated immediately above the diſeaſed part of the ſkull;—and its proceeding from the ſkull explains to us, abundantly well, why it is ſmall, circumſcribed, and puffy; for we find, that this puffy tumor is the peculiar mark of a diſeaſed bone; and its being circumſcribed and circular, is a natural conſequence of the tumor being limited to that part of the ſkull

which is hurt. Whether it be originally from a diſeaſe of the ſcalp, or from an internal affection of the dura mater, ſtill this puffy tumor is a mark of danger; and when we open ſuch a tumor, we find the pericranium thickened and raiſed; a thin ſanies is collected betwixt the dura mater and ſkull; the ſkull itſelf is rough and bare, inclined to yellow, or ſometimes of a dark colour, quite different from that of the ſurrounding parts, where the membrane is firm and ſound; ſometimes a ſmall fiſſure aſſures us more abſolutely of the danger within, yet, without this mark, we know, by mueh experience, that wherever the pericranium is thus inflamed and ſuppurated, the dura mater is ſeldom ſound.

This is the ſecond example of that ſympathy betwixt external and internal parts, whieh I have deſcribed with ſo much eare, only beeauſe it ſhould be mueh obſerved. This is the lurking danger whieh keeps a man ſo long, for many weeks, or even months, in a lingering and ſickly eondition, and proves fatal in the end: This is the puffy tumor whieh Mr. Pott, and all modern ſurgeons, have ſo much noticed; this is the kind of danger, which makes Paræus deelare, that there is no ſafety for the patient till a hundred days have expired *. It has been well marked, even from the time of Hippocrates, (who firſt noticed this

* Toutesfois tu noteras, que les anciens ont eſcrit, (ce qu'on void ſouvent par experience que les fractures du crane ne ſont hors du peril, juſque à cent jours apres la bleſſure; faite partout fay avec ton patient bon guet, tant en ſon boire, manger, repos, coit, & autres choſes. Page 229.

kind of danger), down to this preſent day. It is through our apprehenſion of this kind of danger, that, while we do not deſpair in the moſt terrible wounds of the ſkull, we never diſregard even the moſt trivial wound. A bruiſed blow with a club, the wound of a ſtone, hitting the head againſt the door, even the ſlighteſt injury may bring on this moſt dreadful diſeaſe.

It is this, expreſsly, which makes gun-ſhot wounds of the head ſo much more dangerous than common wounds. Indeed, it is eaſy to conceive how the oblique touch of a ball, though it ſeems to graze but ſlightly, will cauſe this miſchief. We know, that the bruiſing of the inward parts againſt the ſkull is exactly equivalent to the bruiſing of the outward parts, hurting the pericranium;—and how the pericranium will corrupt the ſkull, and the ſkull the dura mater; and how in the end, after ſlow and very gradual ſymptoms, the dura mater will draw the brain into diſeaſe, it is very eaſy to conceive.

One ſoldier, for example, ſhall have his temple grazed with a ball, ſhall hardly know that he is hurt, or be ſenſible, for ſome time, that he is indiſpoſed;—ſhall walk about for ſix weeks, apparently in perfect health; and then, all at once, ſhall droop, and fall low, become ſick, and weak; ſhall, at laſt, fall into coma, or awaken into the moſt dreadful ſtruggling delirium, and then expire: And it ſhall be found, that the pericranium is ſeparated from the ſkull, the ſkull itſelf black, and the dura mater inflamed, and oppreſſed with pus: While, on the other hand, another

ſoldier in the ſame battle, ſhall be ſo wounded with a ſabre, that the ſcalp, ſkull, and all, ſhall be cut clean away with a wound even of the brain itſelf, and yet the patient eſcape; or, which is more ſingular, a ſoldier, wounded with a muſket-ball, which is left ſticking in the ſkull, with much depreſſion and many fractures of the bone, ſhall come to the hoſpital, walking alone; ſhall ſuffer the extraction of the ball, and all the inciſions and pickings of bone, which ſuch a caſe require; and ſhall eat and drink heartily, ſleep ſoundly, and ſuffer not one bad ſymptom during his tedious cure. All this looks as if confined matter, and a lurking diſeaſe were more dangerous than the worſt open fracture, and makes us watchful of ſuch ſymptoms; and, indeed, it often diſtinguiſhes the experienced ſurgeon, that he foreſees the greateſt danger, where, to the ignorant friends, there ſeems to be leaſt cauſe for alarm. The contraſt of two ſuch caſes, though ſeen but once in our lives (yet we have, but too often, occaſion to ſee them contraſted thus), would almoſt perſuade us to be of opinion with Le Dran and others, who ſeem to believe, that the more fracture there is, the better; that the yielding and fracture of the cranium ſaves the brain from concuſſion.

But it belongs to the preſent occaſion, to obſerve rather the inſidious and dangerous nature of this ſlow diſeaſe, than the wonderful recoveries after broad fractures of the ſkull. Wherever this puffy tumor ariſes, and the bad ſymptoms enſue, we are to uſe the trepan; and, ſometimes, before we have cut half

through the ſkull, foul matter begins to iſſue through the trepan hole; or ſometimes, matter being collected under the dura mater, makes that membrane very tenſe, and oppreſſes the brain, ſo that we find it neceſſary to open that membrane alſo. The patient is generally, for the time, relieved, but, often, he is again oppreſſed, and ſinks, and dies;—or, if he lives, great fungi, ſooner or later, ſhoot up through the opening; and, by theſe, as well as by blood or matter, he is, at laſt, oppreſſed, and dies commonly in convulſions. In ſhort, ſuch are the dangers of expoſing the brain, that I begin to incline to this opinion, that though it is abſolutely our duty to make one opening for the evacuation of matter; yet if that one be free, it is unneceſſary to multiply the openings; for the danger, on one hand, viz. by oppreſſion and inflammation of the brain, is juſt proportioned to the delay in opening the head; and, on the other hand, the danger after the operation is exactly proportioned to the number of holes.

Upon the whole of this matter, my notion is, that a man, who is not ſaving of the ſkull, is little better ſkilled in the principles of ſurgery than Godifredus, chief ſurgeon to the States of Holland, who boaſted of a friend of his, Henry Chadborn by name, alſo a ſurgeon in Holland, who had trepanned the head of Philip Count of Naſſau twenty-ſeven times; which Henry Chadborn had been ſo far from being inſenſible of this honour, that he got it ſettled by the following good certificate, under the prince's own hand: —*Ego, infraſcriptus, atteſtor me, ab* HENRIO CHADBORN,

Chirurgo Neomagnesi, *poſtquam vigeſies ſepties mihi caput perforaſſet recte ſuiſſe ſanatum.* Datum Weichemi, 12mo, Auguſtii, anni 1664.—And as for the ſurgeon who does not ſpare the ſcalp, or rather, who does not labour to ſave it, as the main point of his practice, he is little better ſkilled in his profeſſion than the barber mentioned by Wiſeman, who ſeems to have had a moſt Indian-like faſhion, whenever he was called to a broken head (as barbers often were in thoſe days), of cutting off the ſcalp, and hanging it up, as a trophy, in his ſhop; that thoſe who came only to be ſhaved, or bled, might know how great a ſurgeon he was *.

OF IMMEDIATE AFFECTIONS OF THE BRAIN.

Theſe affections of the brain, which I have juſt explained, are ſecondary; only this delirium proceeding from high inflammation, or this oppreſſion and palſy proceeding from matter generated beneath the ſkull are indeed very frequent; but yet the immediate injuries of the brain claim ſtill more of the ſurgeon's attention. In reſpect to theſe immediate injuries of the head, you cannot acquire a mature and ſteady judgment but by reading and reflection, and much experience; if you obſerve theſe injuries only in detail, you will find the varieties infinite, and will ſee

* A young fellow, a ſervant to a horſe courſer, was thrown off his horſe againſt ſome of the bars in Smithfield, whereby the calvaria, or hairy ſcalp, was torn up from the coronal ſuture to the temporal muſcle on the left ſide: The ſkull was bared between two and three inches in breadth; he was led to the next barber, who cut the piece off, and hanged it up in his ſhop. Wiſeman, page 124.

nothing but inextricable confuſion; if you learn to claſs and arrange the facts, you will find that the kinds of injury to the brain are really few and ſimple, that there is indeed one only, with which, as ſurgeons, you have any concern, or which your operations will relieve, that is COMPRESSION OF THE BRAIN.

To believe that a fractured ſkull is a chief cauſe, or even an abſolute ſign of danger, is a very miſtaken and vulgar notion; it is not the damage done to the ſkull, but the injury to the brain, that is the cauſe of danger, and the fracture of the ſkull is but a faint uncertain mark of the harm done to the brain. The varied appearance, after injuries ſeemingly alike in all points, is very perplexing; but this we often have occaſion to obſerve, that no particular injury, no harm to one point only of the brain, is fatal; that the fatal injury is always either that univerſal ſhock which we call CONCUSSION, or that general preſſure which we call COMPRESSION of the BRAIN; except theſe two kinds of injuries, we know of none that is abſolutely fatal; and perhaps we may with all ſafety, affirm, that there is, after all, but one kind of injury, ſtrictly ſpeaking, viz. CONCUSSION of the BRAIN that is fatal; for the brain itſelf may be wounded with weapons driven into its ſubſtance, may be cut and torn by fractured bones, may be waſted with great ulcers and tedious ſuppurations, or by collections of water the brain may be almoſt annihilated, without any remarkable affection either of the living principle, or of the rational powers. I have ſeen people ſurvive prodigious effuſions of blood for many days, their judgment being very little affected; and men lying under ſuppuration of

the brain for many weeks, and dying very eaſily and ſlowly; I have very often ſeen the remains of moſt unequivocal depreſſions of the ſkull *(e. g.)* from the kick of a horſe in boys who have grown up (the depreſſion ſtill continuing) till they became ſtrong and healthy men. Since then no property of the living ſyſtem is hurt, none of the ſenſes diſturbed, none of the functions interrupted, ſince the man not only lives under this load of injury, but abſolutely is reſtored to perfect health and ſtrength, after a loſs of the ſubſtance of the brain itſelf, we perceive clearly that no partial affection of the brain is fatal.

But CONCUSSION is an affection of the whole nervous ſyſtem, indefinite and inſcrutable, which is often fatal: we cannot conceive its nature before death, we cannot find by diſſection what is wrong, we cannot prevent its conſequences. It is ſome inconceivable derangement of the brain which ſometimes follows a blow, even of the ſlighteſt kind, or which is produced, as its name implies, by a ſhock without a blow. A man falls from a great height, is not merely ſtunned by the fall, but lies oppreſſed, as if apoplectic, paſſing his fæces involuntarily, his pupil is dilated, his pulſe ſlow and intermitting, his breathing laborious, ſonorous, and alſo ſlow, his limbs cold, ſometimes paralytic, ſometimes convulſed, and thus he dies; no injury can be diſcovered externally while he was alive, and when he is dead no injury can be found within; the brain is ſound, the membranes firm, no blood, nor matter, nor diſplaced bone oppreſſes the brain; he dies of a kind of injury concerning the nature of which we chooſe to expreſs our ignorance, by calling it a CONCUS-

SION of the BRAIN. Since there is no viſible derangement, we muſt continue, until we learn more concerning its nature, to conſider it as ſome immediate diſorganization or derangement of the whole brain, and we call it concuſſion, becauſe it ariſes not from any particular injury, but from the general ſhock; it is more readily produced by falls, than by blows; it follows a fall upon the breech, as well as a fall upon the head; it has enſued after a fall, even upon ſo yielding a fluid as water; it proceeds from the general ſhock and derangement, but its particular nature is unknown; only this much we do know concerning its ultimate effect, that it produces a general weakneſs of the whole body, and the cold extremities, dilated pupil, laborious breathing, and intermitting pulſe, are the ſigns of this weakneſs; and ſtimulants are well known to be the only cure. Bromefield began to uſe his ſudorifics with advantage, without knowing what it meant, while it was really owing to the opium which they contained: wine was next uſed; bliſtering on the head was next uſed; and at laſt hartſhorn itſelf was uſed with good effect. In ſhort, that fact was diſcovered only by ſlow experience, which might have been underſtood from the moſt direct analogy, viz. that concuſſion is a ſtate of weakneſs; for when a man is knocked down with the fiſt, for example, he groans, is oppreſſed, vomits, is deadly pale and cold, he is as in a faint; when he awakes, he ſtaggers, has confuſion of head, headach, and ſickneſs of heart, and he is beſt recovered by hartshorn, or wine. Now, had this ſtate continued, it would have proved fatal; had it been ſo, we ſhould

have ſaid it was of concuſſion that he had died; the ſpecies is not changed by the degree of the affection: we know this concuſſion, whether temporary or permanent, whether ſlight or fatal, to be merely a ſtate of weakneſs; and we have fair warning to forſake the old plan of profuſe bleedings in all injuries of the head; we know that there can be no dangerous injury to the head, without ſome degree of concuſſion of the brain, and, therefore, in every oppreſſed patient we give opium and wine.

Compression is like concuſſion, an affection of the whole brain, and in ſo far as we know it by ſymptoms, it is entirely the ſame; for a lethargic ſtupor, ſonorous breathing, oppreſſed and ſlow pulſe, and dilated pupil, are the chief ſigns of it. Compreſſion, moſt probably, produces a degree of that diſorder or derangement by which concuſſion is fatal; and one might ſay, without a violent figure, that compreſſion were like a continued blow; that had the blow been withdrawn the moment the man fell, he would have revived immediately; but by the bones being depreſſed, or blood being poured out under the ſkull, the blow is, as it were, continued; and, when after ſome days the bone is raiſed up, the man begins inſtantly to revive and move.

Then theſe ſeveral kinds of injury may be contraſted thus with each other: a partial injury to the brain, even although it deſtroy the ſubſtance of the brain, though there be, as I have often ſeen, a deep ſuppuration and waſting of the medullary ſubſtance of the brain, is not abſolutely fatal; the man lives

and is very little affected, and ſometimes he recovers. Secondly, A general injury of the brain by ſhock or concuſſion is fatal; it is a kind of injury, the nature of which we can neither underſtand before death, nor diſcover by diſſection, and which our operations cannot cure. Thirdly, A general injury by oppreſſion or compreſſion of the brain, is moſt probably like, in its nature, to a general concuſſion, differing from it only in degree, the one being a permanent incurable derangement, the other a temporary derangement of organization eaſily removed. There is ſometimes a CONCUSSION temporary and ſlight, as after a blow with the fiſt, which ſoon vaniſhes; ſometimes a more dangerous one, as by a fall from ſome great height, which is permanent and fatal. And, in like manner, there is ſometimes a ſlighter derangement from COMPRESSION which we can relieve by raiſing the bone, or giving vent to matter or blood; and ſometimes a permanent derangement, or perhaps, as ſome will ſay, a degree of concuſſion along with the compreſſion, which our operations cannot relieve. Thus it would appear that no partial injury is neceſſarily fatal,—that concuſſion, or this unknown internal derangement of the brain, is, if it goes a certain length, irremediable and abſolutely fatal,—that compreſſion, which is like concuſſion, is alſo often fatal; while ſuppurations waſting even the ſubſtance of the brain hardly affect the vital or the mental powers, a patient living with an abſceſs deep in the very ſubſtance of the brain: and what is very curious, this internal ſuppuration produces its worſt effects, when the matter begins to be confined and

to oppreſs the whole brain, ſo that even in this caſe it is not ſo much the deſtruction of a part, as the oppreſſion of the whole, that is a cauſe of danger.

If there be an injury of the ſcalp, a hurt of the ſkull, an internal ſeparation of the dura mater, or any injury, which endangers inflammation of the brain, and if, along with that kind of danger, there be actually ſymptoms which mark inflammation of the brain, we try to prevent or moderate the inflammation by bleedings. If there be a concuſſion, and that the patient lies oppreſſed, vomiting, with difficult breathing and a ſlow pulſe, we uſe opium, wine, and all forms of ſtimulants. If there be, along with this oppreſſion, external marks of injury, after an accident, ſuch as might cauſe extravaſation of blood or depreſſion of the ſkull, in ſuch caſe our duty is, firſt, to open the ſcalp ſo as to examine the ſkull, and next, to trepan the ſkull, if it be not found, with the hopes of relieving the brain.

Thus you perceive, that no injury requires operation, except compreſſion of the brain, which may ariſe either from extravaſated blood, or from depreſſed bone, or matter generated within the ſkull.

* The vaſcular ſyſtem withint he the ſkull is ſo very

* The vaſcular ſyſtem within the ſkull, is what the ſurgeon is leſs curious about, for if it is burſt, or otherwiſe hurt, there is no helping of it; but the vaſcular ſyſtem without the ſkull, he is more intereſted in knowing well; and accordingly we have many directions about the way of managing the frontal and temporal arteries, but none, ſo far as I remember, ſo curious as that which I ſhall now quote. "In wounds of the forehead, hæmorrhages are troubleſome,

profuſe, that extravaſations are very frequent, both on the ſurface and in the cavities of the brain. Sometimes the veins of the choroid plexus burſt, and then the ventricles are filled with blood, but this is leſs frequent after falls or blows than in diſeaſes; ſometimes the ſmaller ſinuſes or veins about the baſis of the brain are torn, eſpecially in counter-fiſſures, filling the ſkull

on account of the bleeding arteries running in a groove of the bone." This is an old fooliſh ſtory, bandied about from hand to hand; it is in every book, old and new, ſo far the thing is excuſable; but the following operation, as deſcribed in the next paragraph, is not to be paſſed over.

"When the hæmorrhage continues ſo profuſe as to endanger the patient, it may be proper even to remove that portion of the ſkull in which the veſſel is incaſed; or in the hands of a NICE OPERATOR, the intention may be anſwered by taking away only the outer table of the ſkull; for, in ſome caſes, theſe arteries run for a conſiderable ſpace between the two lamina of the bone, and in ſuch inſtances our object muſt be accompliſhed by the removal of one of them." Vide Benjamin Bell's Syſtem of Surgery, vol. v. p. 169. I declare that I know nothing about the artery "running for a conſiderable ſpace between the two lamina of the bone." Monro, I dare ſay, knows nothing about it; and this is at leaſt one new operation, which Mr. Bell has a fair title to, and which I am ſure he never ſtole from Dr. Monro. Has Mr. Bell ever ſeen a ſkull? or read of a ſkull? or heard of a ſkull? or can he point out any drawing of a ſkull, among all the books of the anatomiſts? with an artery ſunk into the frontal bone? Until Mr. Bell ſatisfy me, in ſome way or other, about this artery, I ſhall hold this as one of the curious examples of the art of writing a ſyſtem of ſurgery by conjectures and mere gueſs. And even when Mr. Bell has found out the ſkull that he wants, I ſhall ſtill take the privilege of ſaying, that if any young man were, on his authority, to apply the trepan for ſuch a reaſon, he would probably kill his patient.

down to the occipital hole, and ſometimes deſcending into the canal of the ſpine; ſometimes the blood burſts from the delicate veins of the pia mater, and then the ſurface of the brain is covered with blood; and very often the artery of the dura mater is burſt or torn, ſo as to oppreſs the brain with blood; when this happens, the caſe is ſtrictly an aneuriſm of the brain, and as in aneuriſms or burſtings of the internal mamary or intercoſtal arteries, the heart and lungs are oppreſſed; this aneuriſm of the artery of the dura mater oppreſſes the brain. This is the moſt frequent accident of all, becauſe the artery of the dura mater is moſt expoſed to be pricked or lacerated, in fractures of the ſkull; it is in a manner incaſed within the bone; but it is the leaſt dangerous, becauſe the moment we trepan the ſkull we give vent to the blood.

There is ſtill but one motive for applying the trepan, viz. to relieve the brain from compreſſion; whether that be from blood, matter, or depreſſed bone. If there be blood, it is to be known only by gueſs, by having opened the ſcalp at the place of the blow, in the expectation of finding a fracture of the ſkull; and by next trepanning the ſkull, in hopes of finding blood lying upon the ſurface of the brain. But if ſtill after opening the ſkull the patient ſhould lie comatoſe and oppreſſed, it being plain, that he muſt die if not relieved; and if alſo, from the tenſion of the dura mater, we ſuſpect that there is blood under that membrane, we muſt venture to open it alſo, in hopes of relieving the brain. If matter, lying upon the ſurface of the dura mater, be the cauſe of the compreſſion, it

will be known by the previous ſymptoms; by quickneſs of the pulſe, headach, fluſhed face, turgid eyes, corded feeling in the head, and all the other ſigns marking an inflammation of the brain. And if, after all theſe ſymptoms, ſhivering, languors, faintings, ſlight vomitings, and delirium come on, we are ſure of the caſe. If there be found a fiſſure of the ſkull, that fiſſure is not itſelf the cauſe of danger, but it is the mark of that degree of injury, which may have produced extravaſation; it alſo marks the place of the violence, and points out where we ſhould apply the trepan. A fiſſure is not of itſelf a motive for trepanning the ſkull; but if with the fiſſure the patient lies oppreſſed, then the oppreſſion is the mark of danger, perhaps, from extravaſated blood; and the fracture, or fiſſure of the ſkull, marks the point on which we ſhould apply our trepan. When the bones are directly preſſed down by the blow, our way of proceeding is very plain; if the bones be moveable, we raiſe them gently up, if they ſeem totally diſengaged, we pick them away, if the bones be locked in one with another, and preſſed under the ſound ſkull, we cut out one angle with the trepan, and that enables us to raiſe the depreſſed bone.

In all this operation we ſhould be gentle, and rather reſerved; for when blood has covered the whole ſkull from the ſagital ſuture quite to the petrous bone, it has all been evacuated by one ſingle opening, and the patient ſaved. When there has been pus generated in great quantity, and much of the dura mater detached, one ſingle perforation has been ſufficient.

When pieces of the ſkull have been apparently ſo detached from their membranes, that they have ſeemed irretrievably loſt, they have, notwithſtanding, lived and healed, eſpecially in young patients; and often, when the depreſſion has ſeemed ſo great, that the ſurgeon has neglected to raiſe it, or has been ſo difficult to raiſe, that he has forſaken it, the patient has lived notwithſtanding the great oppreſſion, and been reſtored to perfect health.

Thus, once more I recommend to you to be gentle, and modeſt, at the ſame time that you are daring; and I venture to ſay, that no man, who knows of theſe things, will inſiſt upon raiſing, with unrelenting accuracy, and to the expreſs level of the ſkull, every depreſſed piece of bone, unleſs he were indeed a ſurgeon ſo very careful, "That in a wounded inteſtine, he would not leave even the ſmalleſt opening, that could admit either chyle or fæces to paſs, without ſtitching it up." But this is a kind of ſurgery which I have no good opinion of; you are not to uſe the trepan, unleſs when you have ſome direct and plain motive; there is enough of ſurgery, and of operations of all kinds, without ſuch imprudence; imprudence of this kind is quite unbecoming in a man who has grown old in ſurgery; but in one who pretends to teach the ſcience to others, it is dangerous in the extreme. Therefore, having laid down theſe few poſitive directions, I ſhall now mention one negative rule; and I ſhall explain it to you very roundly, viz. that you are not to hearken to thoſe writers, who are ſo hardened in ſurgery, or ſo childiſhly fond of opera-

tions, as to trepan the ſkull as willingly without any reaſon or apology, as when the motives are direct and clear. How much muſt a young man be ſurpriſed, at being told, firſt of all, that the operation of trepan is in itſelf, indeed, and independent of the accidents which have required it, a very dangerous one; but that, notwithſtanding this, it muſt be often performed, when we neither know what ails the patient, nor in what part of the head his diſtreſs lies: that when the patient lies ſtupid and oppreſſed, though we do not know whether it ariſes from compreſſion, or from the ſhock merely, or whether it ariſes from the depreſſion of the cranium, or from the effuſion of blood, we are ſtill to trepan;—how much muſt a young man be ſhocked with the cruelty and abſurdity of ſurgery, when he is told firſt, that when there is no tumor, nor any other outward mark of injury, he muſt examine round all the head, thumbing and ſqueezing it, and the moment that the patient ſeems to ſhrink, there to cut into the ſkull; next, that when he finds the outward ſurface of the ſkull ſound, he is to preſume, that the *inner table* of it is broken, and to apply the trepan; next, finding the inner table alſo entire, he is to cut through the dura mater, looking for blood, or ſomething under that membrane; and laſtly, having found his perforation at one point of the head ineffectual, he is to repeat his perforations all round, on various parts of the ſkull. This is the expreſs rule which a modern author gives to "young practitioners." And every want of motive, and every appearance of want of ſucceſs, is to puſh us deeper and deeper in

this deſperate operation. What muſt a young man think of the ſcience which he has ſet himſelf to learn? What muſt be the feelings of any old or ſenſible man of our profeſſion, when he is told, that this ſingle piece of ſurgery is diffuſed over fifty pages, is blazoned and enforced with the moſt violent aſſertions, and is exhibited as one of the moſt meritorious improvements in modern ſurgery. But leſt my motives, for the wholeſome criticiſms which I am now going to make, ſhould not be very manifeſt, I ſhall quote the text; and, having done ſo, I may then almoſt leave you to judge for yourſelves. "But when no tumor, inflammation, or any other mark of injury, is diſcovered, we may, on ſome occaſions, be directed to the ſeat of the accident, by preſſing firmly over the whole head; and if we find, upon repeated trials, that preſſure produces more pain in one particular part than in others, a circumſtance of which we may be convinced, if the patient moans much upon preſſure being applied to it; and if he puts up his hand, or draws away his head, on this trial being repeated, we may conclude, with much probability, that this is the ſeat of the injury *." "When, therefore, the ſymptoms of a compreſſed brain are evidently marked, we ought, without heſitation, to proceed to examine the ſtate of the cranium, wherever appearances clearly point out, or even where they lead us only to conjecture where a fracture is."

"We do this by laying the bone bare, by making

* Vide Benjamin Bell's Syſtem of Surgery, vol. iii. page 39.

an incision with a scalpel through all the external coverings of the skull *." Upon the teguments being divided, if the skull is found to be fractured and depressed, the nature of the case is thus rendered clear and obvious; and the means which we shall afterwards point out, for the treatment of fractures, attended with depression, should be immediately employed. " But, even in cases where no outward appearance of a fracture is met with, and where no tumor, discolouration, or other external mark of injury is discovered, if the patient continues to labour under symptoms of a compressed brain; if the pericranium has been separated from the bone; and especially if this last has lost its natural appearance, and has acquired a pale, white, or dusky yellow hue, the trepan ought to be applied, without hesitation, at the place where these appearances mark the existence of some injury †."—" Again, although no mark, either of fracture or of any disease underneath, should appear on the external table of the bone newly laid bare, yet there is a possibility, that the internal table may be fractured and depressed. This, indeed, is not a common occurrence, but various instances of it are recorded by authors: I have met with it in different cases; and other practitioners, on whose accounts I can place the most perfect confidence, likewise mention it. ‡."

" In ordinary practice, if no benefit is reaped from the application of the trepan, if there is no fracture

* Ibid. vol. iii. page 40

† Ibid. vol. iii. page 44.

‡ Ibid. vol. iii. page 45.

diſcovered of the internal table of the ſkull, or no extravaſation on that part of the brain, newly denudated by a removal of a piece of bone, and if blood-letting, laxatives, and the other means uſually employed, do not remove the ſymptoms of compreſſion, it is generally concluded, that they depend, either upon a concuſſion of the brain, or upon extravaſation in ſome of the internal parts of it, where the effects of an operation cannot reach; and accordingly the patient is left to his fate, without any attempt being made for his relief *."

"In whatever part of the head the patient complains, on preſſure being applied to it, the ſkull ſhould be laid bare by an inciſion, in the manner we have mentioned. If both tables of the ſkull are fractured and depreſſed, the cauſe of all the miſchief will thus be diſcovered; but, even although no ſuch depreſſion or fracture ſhould be met with in the external lamella of the bone, as there is at leaſt ſome chance of miſchief being met with underneath, either from a fracture of the internal table, or from extravaſation; and as nothing can ſave the patient but a removal of this, the trepan ought to be immediately applied; and wherever there is the leaſt reaſon to ſuſpect, either from pain being induced from preſſure applied in the manner we have directed, or from any other circumſtance, that miſchief may be concealed: as long as relief has not been obtained by what was previouſly done, the operation ought ſtill to be re-

* Ibid. vol. iii. page 48.

peated, as being the only means from whence any advantage can be derived *."

"But it often happens, that no external mark is to be met with to lead to the ſeat of the injury; even after the whole head is ſhaved, and examined with moſt minute attention, the ſkin will, in various inſtances be found perfectly ſound, without any appearance either of tumor or diſcolouration. A patient, in ſuch circumſtances, we ſuppoſe to be in great hazard, from the brain being compreſſed in one part or another: Unleſs this compreſſion be removed by an operation, he muſt in all probability die; in what manner, then, is a practitioner to conduct himſelf? The ſituation is diſtreſſing; but ſtill, in my opinion, there ſhould be no heſitation as to the line of conduct a ſurgeon ought to purſue, which ſhould be quite the reverſe of what is almoſt UNIVERSALLY ADOPTED."

"It has hitherto been held as an eſtabliſhed maxim never to apply the trepan, in compreſſion of the brain from external violence, where no external mark occurs to point out the ſeat of the injury †;" "we ſhall ſuppoſe, therefore, for the reaſons now mentioned, that the trepan is to be applied on the account of ſymptoms which accompany a compreſſed ſtate of the brain; but where no external mark indicates the particular ſeat of the injury, it may be aſked in what manner is an operator to proceed? As the cauſe producing the compreſſion may exiſt as readily in one part of the

* Ibid. vol. iii. page 50. † Ibid. vol. iii. page 117.

brain as in another, it may ſeem to be a matter of little importance in what part of the head the firſt perforation is made. This, however, is far from being the caſe; for, as we are ſuppoſing the compreſſion to be induced by blood or ſerum, and as theſe, while in a fluid ſtate, are always paſſing as much towards the baſis of the brain, as the connection between the dura mater and the internal ſurface of the ſkull will allow; it will be proper to form the firſt perforation in the MOST INFERIOR PART of the cranium in which it can with any propriety be made, and TO PROCEED TO PERFORATE EVERY ACCESSIBLE PART OF THE SKULL, till the cauſe of the compreſſion is DISCOVERED *." "But, as the ſafety of thoſe intruſted to us ought to be our firſt and great object, and profeſſional fame only a ſecondary conſideration, whenever we are certain that death muſt enſue, if not prevented by the timely application of a proper remedy, although there may be very little certainty of this remedy proving ſucceſsful; yet if it is the only means from whence there is any chance of ſafety, it ought undoubtedly to be employed. It is on this principle ſolely, that I have adviſed the practice of perforating the ſkull in different places, when, in caſes of compreſſed brain, the part chiefly affected is not pointed out by ſome external mark of injury †."

Any man may ſometimes be ſeduced, ſo far as to do incautious things in the heat and buſtle of an operation; but to write all this in cold blood is quite beyond the common. I might, indeed, very ſafely leave

* Ibid. vol. iii. page 121. † Ibid. vol. iii. page 130.

this to your own good ſenſe; but I muſt, in a few words, entreat you to conſider whither this practice would lead you. A boy is ſtruck by another with a ſtone, lies for many days bleeding at the noſe, comatoſe, vomiting, and with every bad ſymptom; his ſurgeons are all the while adviſing the operation, his friends are pleading for a reſpite, when the boy begins gradually to recover, and is in a few days perfectly reſtored. I have ſeen a prudent phyſician reſiſt with great perſeverance, while a bold ſurgeon, on the other hand, was violently bent on the operation, and the boy in a few days recover. I have known a gentleman after falling from his horſe, lie for many weeks oppreſſed, and in a profound coma, with continual vomitings, and bleedings from the ears ſo profuſe as abſolutely to endanger life, who yet recovered perfectly. Often, in the Hotel Dieu, where they dare not perform this operation, we hear of patients lying oppreſſed for many days, and weeks, and yet recovering in the end; and in every hoſpital we occaſionally ſee the ſame. Mr. Pott obſerves, "that ſymptoms of oppreſſion are no good reaſon for cutting the integuments, and that the loſs of ſenſe, the hæmorrhagy from the noſe and ears are ſometimes totally relieved by the common means *." Conſider if, in any given

* Mr. Bell of Albie having drunk too freely, was thrown from his horſe as he was riding home; he lay for ſome time on the ſnow, cold and benumbed,—no wound nor bruiſe could be diſcovered, only there was a ſmall ſwelling above the left eye, and that eye-lid was paralytic. His friends thought him in a ſound ſleep; but in a few hours he awoke in a violent frenzy, furiouſly mad, beating every one that

caſe, the patient lying oppreſſed, and having no mark of injury outwardly, upon the head, you ſhould adviſe the trepan, while a man who had ſtudied more the common ſenſe of ſurgery than the authorities of ſchool books, ſhould prevent this unmeaning operation; and if, in the meanwhile the patient ſhould be entirely relieved! what would become of you? Or, if you ſhould be allowed to perform your operation, and ſhould find nothing wrong, what conſolation would that be? But if without any kind of motive you ſhould continue your perforations quite round the ſkull, I dare aſſure you, that there is but one man alive who would ſtand forth to vindicate your conduct, and whether, after the experiment were made, he would have the boldneſs to do that, which, in all conſcience and honeſty, he ought to do, I do not know. This muſt be, no doubt, a precious leſſon for young ſurgeons; the danger and folly of the thing is what muſt chiefly affect every ſerious perſon; but beſides that, the following quotations muſt be very amuſing to thoſe who know how this matter really ſtands. "Although (ſays Mr. Bell) the opinion I have thus

came near him, and biting thoſe that held him, ſo that it required four men to keep him down in bed, and many more to hold him while the ſurgeon bled him. Mr. Hill, after relating the caſe, and how he recovered his ſenſes ſuddenly, while walking in the fields on the twentieth day, adds this note, "Dr. Gilchriſt and I went often to him with the deſign of applying the trepan; but as no particular ſymptom indicated where that could be done with advantage, we did not think proper to do it by gueſs." Hill, p. 125. In this I am not ſure but that they were pretty much in the right.

ventured to give is not agreeable to general practice, yet as this practice has ancient cuſtom only for its ſupport, being, in every other reſpect apparently ill founded, the advantages which may accrue from a different mode of treatment will only require to be thus fully pointed out, in order to procure it a favourable reception." "Prejudice ariſing from, and ſupported by ancient authority, will here, as in moſt caſes, have ſome effect in preventing a *new* propoſal from meeting with much attention; but I think it probable that no great length of time will be required to place it in a more favourable point of view *." It is a pity to ſee the author in ſuch anxiety about this new propoſal of his; it ſeems to have quite bewildered his judgment, whenever he tried to gueſs about the fate of this important diſcovery; in one moment he ſays, "it needs but to be thus *fully* pointed out to procure it favourable reception;" he ſays with the ſame breath, "prejudice will prevent it." If this maxim of operating with the trepan, only when ſome good motive for ſo doing can be ſhown, is now to be conſidered merely as an ancient cuſtom, I muſt declare that it is an ancient cuſtom with which I am well contented. If nothing but prejudice can account for a man refuſing to trepan when he does not ſee any reaſon for ſo doing, I muſt rejoice that I am as full of prejudice as I could deſire to be; but, after all, though he abuſes us in this manner, about our general practice, Mr. Bell has really no great ſhare in

* P. 131.

this curious diſcovery; for I believe it would be eaſy to convict ſome very old and reſpectable writers, and Heiſter among others, of the wicked and felonious intention of anticipating this *new propoſal* of Mr. Bell's. Heiſter's words are theſe: "Sometimes it is impoſſible to diſcover the particular part of the cranium which is injured; the patient, in the mean time, being afflicted with the moſt urgent and dangerous ſymptoms. In theſe caſes it will be neceſſary to trepan firſt on the RIGHT ſide of the head, then on the LEFT ſide, afterwards upon the FOREHEAD, and laſtly, upon the OCCIPUT, and ſo ALL ROUND until you meet with the ſeat of the diſorder *." Here, for the honour of the old ſurgery, is one man as free from prejudice as could be deſired, and from all other feelings that might trouble a ſurgeon. If I were to take any further pains to refute an opinion, againſt which your ſenſibility, judgment, and every manly feeling muſt be rouſed, I ſhould employ myſelf chiefly in explaining to you how abſurd the intention were, and how melancholy the concluſion would be. As for the intention, it ſeems to me to be nothing more natural than merely this, that the ſurgeon is by all this boring at the ſkull "ſeeking," as a certain great author would have expreſſed himſelf, "ſomething which lies ſomewhere †." And as

* Heiſter, p. 358.

† The author I allude to is Mr. John Hunter, who, in a moſt curious account of a gentleman who had been ſhot in a duel, with a ball which paſſed acroſs the abdomen, informs us moſt minutely, that, "among other ſymptoms, he had frequent vomiting, chiefly of bile, with ſmall bits of *ſomething* that was of ſome conſiſtence." Hunter, p. 546.

for the probable conſequences, I am ſure they are ſuch, that we might with all ſafety claſs the operation under that diviſion of wounds which is denominated by old authors lethalitas per accidens. For "Wounds, (ſays Heiſter*) become MORTAL by ACCIDENTS, either by the ill conduct of the patient himſelf, or by the ignorance or neglect of the ſurgeon." "The accuſed perſon ought to be acquitted, and the ſurgeon indicted."

* Heiſter, p. 31. and 32.

DISCOURSE VI.

ON WOUNDS OF THE THROAT.

It is only by his general knowledge of the principles of ſurgery, and by his particular acquaintance with the parts about the throat, that a man can be prepared for the ugly accidents which overtake us ſo ſuddenly; but yet, however neceſſary this kind of knowledge is, I muſt preſume, that it is rather what you have already acquired, than what I ought to teach you. I ſhall refrain from any other than the ſlighteſt remarks upon the relations of the ſeveral parts of the throat to each other, and ſhall ſtate ſuch, merely, as will aſſiſt you in acquiring correct notions of the accidents which commonly happen, and, what is of fully as much conſequence, of the miſtakes that are very commonly committed; for I ſhall undertake to prove, that many among thoſe who have written caſes of this kind, have ſpoken very looſely, hardly underſtanding the parts which they pretended to deſcribe.

The LARYNX is the cartilaginous part of that tube which conveys the air;—and the connections of the

larynx with the ſurrounding parts are theſe: The os HYOIDES lies under the chin, in that great fold which we call, in fat people, the double chin. It lies, properly, in the root of the tongue; whence it is ſometimes called the bone of the tongue; it cannot eaſily be felt from without; but, when we thruſt the finger down into the throat, in the accident of a fiſh bone, or any foreign body ſticking there, we feel the two ſlender horns of the os hyoides extending and holding open the pharynx or bag, by which we ſwallow;—ſo that the os hyoides, which reſembles the thought-bone of a fowl, has its baſe or angle lodged in the root of the tongue, and its two long horns extending along the ſides of the pharynx.

The firſt piece of the larynx is the THYROID CARTILAGE, the great ſhield-like cartilage which protects all the others, which is eaſily felt, being the moſt prominent point of the throat. The outward projection of it, where it makes its angle in the fore part of the throat, is called the POMUM ADAMI; and within this cartilage, and under the protection of its broad wings, lies the RIMA GLOTTIDIS, or that delicate opening or chink, which forms the voice.

The EPIGLOTTIS, or valve, which lies over the glottis or chink, to defend it, is connected rather with the os hyoides, and root of the tongue, than with the larynx or cartilaginous part of the trachea.

Below this great thyroid cartilage, there is a circular or ring-like cartilage, joining the trachea or membranous part of the tube to the larynx or cartilaginous part; and then the rings of the trachea, five or ſix in

number, complete the tube, to the place at which the trachea goes down into the cheſt. It is upon the very point where the trachea is joined to the larynx that the THYROID GLAND lies.

Behind the trachea, which is rigid, lies the OESOPHAGUS, which is quite a flexible tube; ſo that the LARYNX is the rigid part of that tube which is for receiving air, and the trachea is the continuation of the ſame tube; while the PHARYNX is the large bag, being the beginning of that tube which is for receiving food, and the œſophagus is the continuation of the ſame tube. The larynx, then, is ſo formed as to modulate the voice; the pharynx is ſo large a bag, as to be capable of receiving the largeſt morſel. The larynx can ſhut itſelf ſo accurately, as to prevent the ſmalleſt drop of fluid from entering into the trachea. The pharynx can dilate ſo freely, and can graſp ſo cloſely, as to receive the largeſt morſel eaſily, or ſwallow the ſmalleſt pill, or a drop of water.

Now, the chief point to be remembered, in regard to Wounds of the Throat, is the relation of the carotid arteries to the trachea and larynx; the connection of the great veins and nerves, again, with the carotid artery, and the manner in which the firſt branch of the carotid artery goes off.—Firſt, It is to be remembered, that the arch of the aorta lies in the upper part of the cheſt before the trachea; and that, where the carotid arteries come out from the cheſt, to go up along the neck, they are ſcarcely at the ſides of the trachea, they rather run before it: But that, as the arteries mount up the neck, they incline more to the ſide of

the trachea; and that, at the upper end of the neck, the carotids are entirely behind the trachea; for they incline towards the angle of the lower jaw, and, having reached it, they begin there to give off their branches, both thoſe for the head and thoſe for the neck. From this obſervation one thing very particular is explained,—how a wound at the lower part of the neck will very often be fatal, while a wound in the upper part of it is leſs dangerous. The ſuicide ſeldom ſtrikes at the lower part of the neck; and it is by this accident of ſtriking very high and near to the chin that the carotids eſcape.

Next it is to be remembered, that the carotid artery, the great jugular vein, and the Par vagum, or eighth pair of nerves, lie connected with each other, very cloſely, being all encloſed in one maſs of cellular ſubſtance, forming ſomething like a ſheath. Now, ſince this eighth pair is one of the greateſt nerves of the viſcera; and ſince, by experiments upon animals, we know well, that a wound of it is more fatal than a wound of the brain itſelf, this puts an end, at once, to all queſtions about the way of managing wounds of the carotid artery, or of the great vein. No doubt, theſe may, ſometimes, be partially wounded, and the nerve eſcape; but, in general, the nerve will be cut along with them, and, at all events, the fear of including it will prevent our ſtriking with a needle in the neck;—we can only take up the carotid artery, when we ſee it bleeding with open mouth, and can pull it out with our finger and thumb; and how near it is to an impoſſibility, that this ſhould happen, and the pa-

tient live till the ſurgeon arrive, you may eaſily conceive.

This plain deſcription of the connections of the trachea, œſophagus, carotid artery, vein, and nerves, explains to you how ignorantly, thoſe authors have written about Wounds of the Throat, who tell us, firſt, a formal ſtory about the wound having paſſed through both the trachea and œſophagus, and then, how the patient was cured;—for it is impoſſible to cut acroſs both trachea and œſophagus without wounding the carotid artery, the jugular vein, and the eighth pair of nerves; you may gueſs, then, whether the wounds they deſcribed were exactly what they believed them to be.

The reaſon for ſaying, in ſuch caſes (ſo eaſily cured), that the wound had paſſed through both the trachea and the œſophagus, is very ignorant: it is merely this, that the ſurgeon ſees both air and food come out by the wound; and no one ſcruples to ſay, when he ſees both air and food come out by the wound, that the trachea and œſophagus are both cut, while the fact is, that neither the œſophagus nor trachea are touched in the leaſt degree, that the wound is much above them; for a ſuicide always ſtrikes immediately under the chin; his wound, as far as I have obſerved, commonly falls in the line or lurk of the ſkin, which divides the neck from the chin:—That is the place where the os hyoides lies, and he commonly cuts the os hyoides away from its connection with the thyroid cartilage or pomum adami. Now, in that caſe, the thyroid cartilage, forming the uppermoſt part of the

larynx, is not touched; the Rima Glottidis lies below the wound, quite ſafe; the wound, indeed, ſeparates the epiglottis from the glottis, but it leaves the glottis and the larynx quite ſafe; it only ſeparates the larynx from the root of the tongue; it is properly a wound in the root of the tongue; it is rather a wound of the mouth than of the throat; and when the food comes out, along with ſpittle and froth, it is by rolling over the root of the tongue.

One thing more is to be remembered, that the firſt branch going off from the carotid artery, is the artery of the thyriod gland; that it comes off from the main artery at the angle of the jaw, and turns downwards along the ſide of the throat, to plunge into its gland. Now, as this artery lies along the ſide of the trachea on its upper part,—and as its tendency is forwards, towards the fore part of the trachea, where the gland lies, it is much expoſed, and is almoſt always cut;—the bleeding from it is terribly profuſe; the patient faints; and the ſurgeon naturally believes it to be the carotid artery; if the ſurgeon does not come early, its bleeding is as fatal as that of the carotid artery itſelf.

When a ſurgeon continues, during all the cure, to dreſs his patient daily, without knowing what parts are cut, or, in delivering the notes of ſuch a caſe, miſnames the parts; he is guilty of ſuch groſs ignorance, that he ſhould hardly be concealed. The following deſcription I introduce, chiefly for the purpoſe of illuſtrating what I have juſt told you;—it is extracted from a Medical Collection, and is entitled "The

hiſtory of a remarkable wound of the trachea and neighbouring parts."—" I found this man," ſays the author, " lying upon the ground, with his throat cut from ear to ear,—and an immenſe effuſion of blood."

" The external jugular veins, on both ſides, were perfectly divided,—the carotid artery laid bare,—the trachea arteria divided from the larynx, above the pomum adami. The epiglottis and glottis entirely detached from the Rima Glottidis;—the trachea cut through, except about a finger-breadth of the back-part, which was very much ſtretched; for the trachea, which was thus divided, had retracted equal with the clavicles."

This is a very ſingular inſtance of ignorance and confuſion: The plain ſtory is this, that the man, having cut his throat from ear to ear, had ſeparated the os hyoides, which lies in the root of the tongue, from the thyriod cartilage, which forms the upper part of the larynx, and conſequently the damage was plainly this; the mouth was cut open rather than the throat, the tongue was cut away from the larynx, and the epiglottis was ſeparated from the Glottis, Rima, or Chink, for this little opening has all theſe names.

To divide the trachea from the larynx, the cut muſt be under the thyriod cartilage, or pomum Adami; but the author tells us, that " the trachea arteria was divided from the larynx, above the pomum Adami," though the pomum Adami is itſelf the bulging of the larynx, and nothing is above it but the os hyoides and tongue; and he tells us next, that " the glottis and epiglottis were detached from the Rima Glottidis,"

as if the Rima Glottidis and the glottis were not actually the ſame. In ſhort, the miſtakes and abſurdities of this kind which are to be found in books, are endleſs, and there could neither be pleaſure nor inſtruction in purſuing this ſubject any farther *.

The chief difficulty lies in underſtanding the anatomy of the parts; for, as a ſimple wound, you know that in this, as in any other, you have but two points to attend to, to ſuppreſs the bleeding, and to procure adheſion. And both theſe points you will underſtand much better, by remembering what I have juſt proved to you, viz. that very commonly the wound is high betwixt the throat and the tongue; for this particular place of the wound makes it eaſy to prevent bleeding, but difficult to procure adheſion.

1ſt, The wound being very high, the carotid arteries are quite ſafe, for at the upper part of the neck

* Mr. Benjamin Bell has made a curious conjecture concerning wounds of the œſophagus: He ſays, "Wounds of the œſophagus are chiefly dangerous, on account of the difficulty of reaching it from its deep ſituation; and from the under part of the œſophagus, when entirely ſeparated from the reſt, being apt to fall altogether within the ſternum; and from the difficulty of ſupporting the patient with proper nouriſhment," p. 167. Now, Mr. Bell, when he was gueſſing about this, might as eaſily have gueſſed, (ſince the back part of the œſophagus lies ſmooth againſt the fore part of the vertebræ), that whenever the œſophagus was ſo fairly cut acroſs, as to ſink under the ſternum, all the parts of the neck muſt be cut, and nothing in fact left, but the vertebræ for the head to nod upon; in ſuch a wound, viz. where the carotid arteries, jugular vein, and great nerve were all cut, I ſhould conjecture, that the ſurgeon would not be long troubled about ways and means of SUPPORTING the patient with PROPER NOURISHMENT.

they retire ſo, that they are really under the angle of the jaw; and you will have obſerved, that in this very caſe, related by the ſurgeon, the throat was cut from ear to ear, and yet the carotids were ſafe; and the carotids were expoſed by the wound, only becauſe the wound extended from ear to ear. It is not the carotids that are touched in the common attempts of ſuicides—it is ſometimes from ſome of the lower branches of the lingual artery, but chiefly from the great thyriod arteries that the man bleeds. The perſon, who does this deed in ſecret, commonly faints and falls down. It is this fainting that ſaves his life. Theſe arteries are large enough to cauſe a fatal bleeding; we are, therefore, careful not to rouſe him from this languid ſtate, till we are ſure that we can command the blood. If, when we arrive, the arteries be ſtill bleeding, we apply the point of our fingers, ſtop the arteries, draw them out with the tenaculum, or tie them with the needle, for in this upper part of the throat the needle may be ſafely uſed; but often during the fainting, they are ſo retracted among the cellular ſubſtance, that we are ſaved all trouble and care, except that of making our outward ſtitches for uniting the lips of the wound.

2d, The REUNION of the WOUND is chiefly prevented by the continual flowing of the ſaliva, by the food rolling out this way, by the continual cough which the irritation of the now unprotected glottis occaſions, by the continual motion in the endeavours to ſwallow, and eſpecially by the tearing motions which take place whenever the tongue or the whole throat moves;

for the os hyoides, or bone of the tongue, is the very point to which all the muſcles which move the throat or tongue are attached.

Our chief object ſhould be, firſt to get the parts into fair and neat contact, ſo that not a particle of food nor of foam ſhould eſcape; and next, to prevent, by all contrivances and every kind of care, the leaſt degree of motion of the tongue, or parts about the throat. It is well known, that if parts do not unite early, it is not eaſy to make them unite at any after period; and yet I cannot tell how often I have ſeen the throat left gaping, to a moſt enormous extent, the ſaliva continually beſmearing the neck and breaſt, and the edges of the mouth-like wound as callous as the palm of the hand.

The effort to ſwallow cannot be entirely prevented, for the patient will, notwithſtanding your remonſtrances, continue to ſwallow the ſpittle, working continually with the throat; but his ſwallowing of food ſhould not be allowed. To nouriſh a man by glyſters, during this tedious cure, is impoſſible; you muſt, therefore, find ſome way of conveying food to the ſtomach, without any effort on his part, by an eel's ſkin, or by a flexible leather tube, ſuch as we uſe for injecting tobacco ſmoke, introduced into the œſophagus.

The continual draining of the ſaliva cannot be prevented otherwiſe, than by cloſing the wound neatly and effectually; it ſhould be cloſed with a number of ſeparate ſtitches proportioned to the extent of the wound. The ſtitches ſhould be neat and firm, through the ſkin and muſcles,—through all the fleſh that you

can get fairly, but not through the cartilages. In the interſtices of the ſtitches, you ſhould lay neat ſlips of black court-plaſter acroſs the lips of the wound,—you ſhould lay a large flat adheſive plaſter over all, to make it firm,—you ſhould bring the head forwards, and bridle down the chin to the waiſtcoat,—your patient ſhould be ordered neither to ſpeak nor to ſwallow; and he ſhould be enjoined rather to let the ſaliva trickle down the corners of his mouth, than to ſwallow it.

In the diſordered condition of his mind, large opiates will help to compoſe him to reſt, and may be uſeful in appeaſing the irritation and cough; and you muſt eſpecially remember, that the preſence of ſome friend is neceſſary both to ſoothe him, and to watch over him. Often, indeed, he falls into a humble and penitent ſtate of mind, and bears every thing quietly; but ſometimes the ſhame of what he has attempted, and the apprehenſion of appearing again in the world, makes him weary of life, wiſhing that what is begun were completed; ſo that ſometimes I have been obliged to bind ſuch unhappy people before they could be dreſſed, and never could think of leaving even the moſt compoſed of them without precautions.

DISCOURSE VII.

ON DANGEROUS WOUNDS OF THE LIMBS.

I NOW come to a ſubject the moſt difficult of all; for it is not to be told merely how to dreſs a wounded limb, or to take up the arteries, or how to dilate the wound, or to extract the balls or the ſplinters of bone; theſe are duties exceedingly eaſy and plain: But there is a queſtion implied, which, from the earlieſt times of modern ſurgery, has been eſteemed a queſtion of high importance, viz. whether we ſhould amputate in dangerous wounds of the limbs; and yet all the ſurgeons of Europe, with the collected ſenſe and experience of the whole, drawn as into a focus, and bearing upon this one point, have left it ſtill undecided. Le Dran ſays, "Wherever there plainly is a neceſſity for loſing a limb, the ſooner it is done the better." While Mr. Belguer exclaims, "To cut off a limb after a bad wound, what is it but to add wound to wound? to heap new pains upon a diſordered ſyſtem? what is it but plainly taking away the patient's life *?" The

* Mr. Belguer's language is of a kind not to be tranſlated literal-

diſputes in the French Academy upon this ſubject have been endleſs.

It is natural for me to tell you how unwillingly I undertake the taſk even of explaining theſe opinions to you, much more of directing your judgment.—But although I know well how impoſſible it is for any man to acquit himſelf to your perfect ſatisfaction, ſince doubts and fears will keep their hold upon your mind; yet this is a matter which cannot be ſlightly paſſed over, ſince the queſtion muſt return upon you daily in practice. In a wound of the breaſt, or of the belly, we can do but little for our patient's ſafety; we cannot root out the diſeaſe; there he muſt lie and take his fate, to die, or to live. But when a limb is miſerably torn by a ball, by machinery, by a loaded waggon paſſing over it, you are thrown into anxiety not to be expreſſed; both through an honeſt fear of your patient's ſafety, and alſo from apprehenſions, not unbecoming, concerning your own reputation. You may cut off the limb in the hopes of cutting off the diſeaſe; or you may try to ſave the limb, at the riſk of your patient's life! But however wiſely you may determine, full hardly ſhall you eſcape calumny! whether you cut off the limb, or whether you try to ſave it, there is danger, there are authorities againſt you on either hand: and of thoſe authorities one repreſents amputation as fatal; another ſays, that wherever the limbs

ly on almoſt any occaſion, and, leaſt of all, when he is poetically inclined; for his figures are never of the elegant caſt.—His expreſſion for this is:—"Interrogo enim unumquemque ex medicis et chirurgis "annon hoc eſſet hominem jugulare."

are ſeverely ſhattered, the accident is mortal: if you hearken to the ill ſucceſs of amputation as repreſented by one party, you will think ſurely no man can be ſaved in this way! and if you liſten to the wonderful tales of others concerning recovery from ſhattered bones and lacerated limbs, you will be apt to exclaim, "How, after this cure ſhould any man be allowed to die," when really this cure ſo much vaunted, is but one caſe picked out of ten thouſand.

In a queſtion like this, you will find it prudent to read but one book or none; either to hold to the advice and practice of one ſurgeon, or wait till you ſee practice, and are brought to an individual caſe, and, unbiaſſed by doctrine, try to follow nature; try to learn, by a little experience, by ſlow degrees, and with ſome hazards, and ſome vexations, how much ſhe really can do for you; what wounds are only dangerous, and what wounds are abſolutely fatal.

Conſidering the great value of experience in ſteadying your mind, I hold it fit, firſt of all, to repreſent to you the nature and conſequences of fractured wounds, before I try to unravel the intricacies of the queſtion before us.

Wounds of the limbs, like wounds of the bowels, are dangerous in proportion to the value of the parts wounded; and this conſideration reduces the ſubject to few points, the wounds of great arteries, the wounds of bones, or the wounds of the large joints. But before I repreſent to you the particular dangers, I ſhall firſt relate the general treatment of any ſuch dangerous wounds. The damage done to a limb by a can-

non-ball, is much like that done by heavy machinery, or by a waggon-wheel paſſing over a limb, like thoſe accidents which happen daily in factories or in mines; both the one and the other conſiſts in a bruiſing and almoſt total deſtruction of the fleſh, a laceration of the great arteries, and fracture, or rather cruſhing of the bones; ſo that many ſmaller pieces are ſplintered and ſeparated, or ſometimes a middle portion of the bone ſqueezed entirely out of the limb.—Even the leſſer gun-ſhot wounds reſemble theſe in their dangers; for wherever a muſket-ball tears the arteries, and breaks the bones, the danger is very great; and therefore, it is moſt natural for me to begin this ſubject by explaining to you the manner of treating thoſe dangerous wounds, where, after all, I muſt ſeem to be employed rather in illuſtrating the dangers of ſuch caſes, than in adviſing a method of cure.

OF DANGEROUS WOUNDS GOING DEEP AMONG THE FLESH.

If a muſket-ball have made a fleſh wound, attended with great ſwelling, you ſhould dilate it; being eſpecially careful to cut the faſcia, as for inſtance, in the thigh, and to divide the fibres of the muſcles, not croſſways, but lengthways. If the ball have made a deeper wound, and hurt the bones, if the tibia and fibula be broken, or the ball have paſſed through the foot or hand, you have much to do; you muſt dilate freely,—make ſo large an opening that you put your finger down into the wound, and get the ſplinters of bone away, or the ball if it remains, or pieces of cloth,

or boot or harneſs; and though ſometimes balls will be cloſed up in the heart of bones, or pieces of bone will be reunited, though apparently too large to be reſtored, ſtill you are not to truſt to ſuch chances, but muſt endeavour to get the ball away with forceps, to cut the piece out with the trepan, to pull away the looſer bones with your finger, to ſeparate alſo thoſe which are ſhaking, but yet connected. All this you may do without being too curious in your ſearches, and pieces of bone, very long and ſharp-pointed, lie often in ſuch a manner in the wound, that while they remain, the bad ſymptoms cannot ceaſe.

When the firſt inflammation comes on, you may find it neceſſary to bleed; but you will be inclined to do it with diſcretion, when you think of the long confinement and many dangers which your patient has to endure. When theſe firſt inflammations are over, your patient falls into that condition which I have formerly deſcribed: At firſt, a mild ſuppuration forms, by and by it becomes profuſe, and ſoon after this profuſe diſcharge, has a manifeſt effect upon his health; there is a large gleeting ſore, looſe and carious bones, fever, diarrhœa, and a great declining of ſtrength; and after this change, the ſupporting your patient's ſtrength is your chief buſineſs during all the cure.

When acceſſions of fever come on with a frequent pulſe, heat, thirſt, and a furred tongue, and a languiſhing and ſickly feeling, which portend a more violent diſorder, this is the approach of a fever not to be ſubdued by bleeding: It is the infection of a foul hoſpital or ſickly camp; it may be, perhaps, from

the gleeting of his extenſive ſore, or from the putrid ſmell of it; and this fever is to be combated with bark and wine. You ſhould give your patient a vomit in the morning, and an anodyne with a draught of warm wine at night; and indeed, in the cure of any wound by which a patient loſes much blood, you ſhould begin by giving him ſpirits and water, or wine; next day, you order the bark in two, four, or ſix dozes a-day according to the occaſion, and ſhould accompany it with laudanum, if it be likely to be thrown up, or with rhubarb and ſome aromatic powder, if a diarrhœa prevails. The patient is ſometimes coſtive, and ſhould have a doſe of rhubarb and aromatic powder, or of magneſia and cinnamon given him; and he is often ſick, for which he ſhould have a cordial provided of centaury gentian, and marmalade of oranges infuſed in ſpirits or wine; which, being mixed with pepper-mint and cinnamon waters, ſhould be given a glaſs full two or three times a day.

Often there is a ſudden attack of fever in the morning, and all is quite at night; often the fever takes a diſtinct ſhape, with a hot, cold, and ſweating ſtage; often it leaves merely a debility, ſhivering coldneſs, and ſickly ſtate; too often the patient falls into the hoſpital fever, his wound mortifies, and he dies. All theſe changes are to be carefully watched, and are guarded againſt by emetics, and opiates, wine prudently given, and, above all, the fever ſhould be met with large dozes of bark, which you will adminiſter in various forms, joining it ſometimes with cordial infuſion, ſometimes with ſnake root, or with ſugar and

ſome eſſential oil in the form of an electuary.—With theſe medicines you fight againſt the febrile attacks and you ſtrive to keep your patient in health, during his tedious cure, with generous diet and wine, careful attendance and cleanneſs, and great care to keep his wounds from being neglected or foul.—During this lingering cure, you have, from time to time, new inflammations with great pain, new abſceſſes, increaſe of the diſcharge, a flabby wound, and alarms, and interruptions of every kind; then looſe pieces of bone preſenting themſelves, which you are obliged to work out with no little pain. And thus, after eight months or more of pain and ſuffering, your patient begins to move about a mere walking ſhadow.

This I ſhall preſently prove to you, is a true repreſentation of the ſufferings and eſcapes of thoſe who recover from ſuch wounds; but firſt I ſhall notice ſome other caſes. Often, let us do what we will, even this much cannot be obtained upon ſuch eaſy terms; the limb falls into gangrene, and the patient is for ſome days in the moſt imminent danger of ſinking all at once; the limb becomes livid and cold, ſmall veſicles ariſe; it loſes all feeling, and becomes black and thoroughly mortified down to the bone. Then the ſurgeon begins his ſcarifications; he ſcores the gangrened parts with inciſions which go down through the dry cruſt of the gangrened ſkin, he carries his knife through the maſs of bloody and corrupted fleſh, down till it touch the ſound parts, or till it touch the bone; he makes his inciſions long in proportion to

the gangrene, at an inch or more diſtant from each other, is careful to avoid the great arteries, or to tie them if they happen to be cut, applies poultices, and when they have ſoftened the hard ſkin, ſcrapes away with his knives the putrid maſs which covers the ſound fleſh, or which goes perhaps down to the bone. Now it is common to ply the wine, and to lay hot and ſtimulant dreſſings over the ſores; to make embrocations and turpentine dreſſings, which are applied upon rags dipped in the hot balſam; and it is uſual to lay ſome ſtimulant fomentation over all, wrapping the limb in cloths ſoaked in decoctions of chamomile ſharpened and made ſtimulating with ſolution of ſal ammoniac and nitre, or by the addition of vinegar or wine. Or to quicken and bring into ſuppuration the ſurrounding parts, ſpirituous fomentation with camphire or ſal ammoniac are uſed; or fomentations are made of wormwood, rue, chamomile, &c. with the addition of camphorated ſpirits.

Theſe applications are meant to correct the fetor of the dead, and ſtrengthen the action of the living parts; and whenever the line of ſuppuration forms, and healthy pus begins to appear through the putrid ſloughs, the ſtimulant medicines are left off, and the pus encouraged by the more natural application of an emollient poultice; and the ſpoiled bones are taken away, or the exfoliating pieces killed thoroughly, and ſeparated by boring with the trepan, or with the perforator. Above all, this rule muſt not be forgotten, that emollient fomentation, and the common poultice, are fitter for the ſmaller wounds of muſket-balls, as, in

the fore arm, the leg, the joints, in fleſh wounds, in ſhort, in all thoſe wounds which we dilate for the purpoſe of preventing tenſion, and which, therefore, are leſs apt to run into a broad or general gangrene. The ſpirituous fomentations are fitter for the bruiſes of great balls, or for the ſtumps of limbs ſhattered by the great balls; and the balſams, turpentines, and other hot dreſſings, are beſt in open gangrene, where the ſcarifications are uſed, or in an open and gangrenous ſtump.

OF BROKEN OR DISLOCATED BONES.

A great ball, grazing obliquely, often breaks a bone or diſlocates a joint, and yet does not harm the ſkin; and where this happens, you can ſeldom prevent gangrene: Very often the ſkin is blackened into a perfect eſchar, the blood that is extravaſated below the ſkin is mixed with muſcles beaten into a mere maſh; and the bones within, are broken into many pieces, the perioſteum being thoroughly deſtroyed. In this caſe, you muſt make your inciſions through the dead ſkin, as in a gangrened part, and apply your hot turpentines and your ſtimulant fomentations; and after the natural ſuppuration, or after your inciſions, you ſearch down to the bones, take away thoſe that are looſe and broken, and compoſe thoſe which are to remain, by laying the fractured limb upon a ſmall pillow, ſmoothing and ſetting the fractured bones with your hand.

But if the bone only be broken by the weight of the ball, while the ſkin is untouched, you muſt not open the ſkin! perhaps the ecchymoſis may be abſorbed, and the parts injured in their texture may be reſtored; you are, therefore, not to open the ſkin, but to compoſe the bones which you feel broken, to lay them gently with your hand, and to ſet the limb eaſily, as in any common fracture of the ſame bones; and moiſten your bandages with fomentations of the diſcutient and ſpirituous kind.

OF WOUNDED ARTERIES.

Thus you perceive that fractures of the bones, beſides the unavoidable attendants, viz. large ſuppurations and tedious cures, often end in gangrene.—But all theſe dangers muſt be increaſed when the artery alſo is wounded; in ſuch caſe, your inciſions muſt be free, your arteries muſt be fairly taken up, and you muſt watch the gangrene, and the time of the ſecondary bleeding: But, in this caſe, your patient's ſafety chiefly depends upon your doing your operation boldly at the firſt, with a free inciſion, and tying the artery ſecurely. Belguer forbids amputation, while one rag of the member remains; and will not allow it to be done in caſes of wounded arteries, any more than in ſhattered bones: Let the ſurgeon, ſays he, ſuppreſs the bleeding by agaric or ſtyptics, or let him take the arteries fairly up. Nor will he allow of amputation, even after wounds in the main artery of a

limb. But we muſt not allow the violence of an enthuſiaſt of this party to prevent our duty; for we feel too often the difficulty of ſaving the limb, even in a ſimple caſe, to doubt of there being moſt imminent danger in ſuch a complicated wound: Often, very often, limbs are loſt when the femoral or humeral arteries are wounded with the clean cut of a knife.—What iſſue, then, have we to look for in a wound of the main trunk, attended with a bruiſed and gangrenous ſore, and with fractured bones.

Perhaps, then, the ſhort rules of this caſe might be theſe: 1ſt, If the artery, even of the thigh, be wounded, with merely a fleſh wound, we muſt try to ſave the limb, though that will not be eaſy. 2d, If the artery of the thigh or arm be wounded, together with fractures of the bones, there is no reaſon to hope that the limb can be ſaved, and making the attempt is but riſking the life, for a very ſlender chance of ſaving the limb. 3dly, Though the tibial and fibular arteries in the leg, or the radial, ulnar, or interoſſeous arteries in the arm, be wounded, although it be with a fracture of the bones, the leg or arm may ſometimes be ſaved (but that with great difficulty, and not without danger) by cutting up the wound, tying the arteries, and picking away the ſplinters of bone.

OF WOUNDED JOINTS.

The wounds of the joints are ſo dangerous by thier high inflammation, that they may be fairly enough

compared with wounds of the great cavities, inflammation, and pain, and violent fever enſue; often the patient dies delirious on the firſt days, or if he ſurvive theſe firſt dangers, it is to die by a great flow of matter, hectic fever, eroſion of the cartilages, and ſpoiling of the bone; and neither can bleeding appeaſe the inflammation, nor opium relieve the pain, nor bark nor diet ſupport him under the vaſt diſcharge. We here pronounce more freely the opinion which we too often need to deliver in common practice, that openings into inflamed joints are fatal; and though there are in every book caſes of anchyloſed joints, we cannot but remember, that for one that has eſcaped by anchyloſis, thouſands have died. In this caſe, viz. of wounded joints, bleedings, poultices, and emollient fomentations, conſtitute almoſt the whole that ſurgery can do. The wounds are to be dilated, the fragments of bone extracted, the patient laid quiet, and the limb as eaſy and ſoft as may be; nothing ſhould be ſuffered to diſturb the patient; he ſhould have large opiates given him, to abate the irritation and exceſſive pain; and, though bleeding may perhaps be allowable at firſt, yet our chief difficulty lies in ſupporting the ſtrength of the patient during the tedious cure.

This laceration of a limb in which its bones are broken, and its texture apparently deſtroyed, where the danger of gangrene is immediate and preſſing, and where the chance is but poor of ſaving the limb, even after thus riſking the life, requires immediate amputation. The laceration of the great arteries, accompanied with driving of blood among the muſcles,

and with fractured bones, is alſo a caſe requiring immediate amputation. The wound of a joint, although in the end it commonly occaſions the loſs of the limb does not in general run into immediate gangrene; there is of courſe time to attempt a cure, and the opportunity of ſaving the patient's life is not abſolutely loſt by that delay.

OF BRUISED AND GANGRENOUS STUMPS.

There is but one caſe more to be explained,—that is, the dreſſing of a ragged ſtump made by a great ball; for, thoſe who condemn amputation in other deſperate wounds, treat this alſo as a mere wound, and will not allow any thing like a new amputation to be performed, but dreſs the ſtump in the following manner*: When a ſoldier is brought into the camp with a thigh or arm ſo ſhattered, that only ſome ragged fleſh or ſkin remains, they cut that away, then with the ſcalpel they cut the ragged fleſh as neatly as may be into the form of a regular ſtump, then cut the larger pieces of bone away with a little ſaw prepared on purpoſe; the leſſer fragments they cut away with the ſcalpel, and they pick the ſtump clean with the fingers or with ſmall forceps, (ſome ſmaller fragments, no doubt,

* I mean, in the following deſcription, to repreſent this practice of Belguer, the celebrated Pruſſian ſurgeon;—and merely to repreſent it to a well informed Engliſh ſtudent, is, I believe, criticiſm enough.

being left for ſuppuration). Then ſqueezing and handling the bone, they try to mould the remains of the limb into the faſhion of a ſtump, the fleſh being thus preſſed down to cover the ſhattered bones, and the bones themſelves ſo arranged by the preſſure, that if they be ſplit upwards, the ſplit is forced together, and ſuch fragments as may be preſerved, are made to adhere; at leaſt, Belguer plainly ſays, that by ſuch preſſure the fiſſure of a ſplit bone may be leſſened or cloſed. There is often no bleeding, no arteries are taken up; and ſometimes theſe ſtumps never bleed during the cure: The ſtump is dreſſed dry with lint, rolled with a gentle bandage, firm rather than looſe, and the ſtump and bandage are thoroughly ſoaked in ſpirits of wine. At every future dreſſing, the ſurgeon is obliged to look for new ſplinters of bone, and often to give new pain, by new pickings of the ſtump; and the truth is, that ſuch ſtump is even from the firſt moment little better than a gangrenous ſurface, with a black and bruiſed appearance, ragged muſcles and blackened ſkin, tendons hanging from it, and ſhattered bones remaining, which the ſurgeon dare not, or cannot take away; and almoſt from the firſt the ſurgeon is obliged to uſe hot dreſſings, turpentines, and balſams, to correct the fetor, and ſuppreſs the profuſe gleety diſcharge. But the eſchar which is eſſential to a gun-ſhot wound, the whole of the blackened and mortified ſurface having ſloughed off, there is danger of a ſecondary bleeding; and the ſtump originally ill formed (and which all this ſqueez-

ing and modelling could not bring into a right ſhape), now loſes much of its ſubſtance; what is left being pale, flabby, and ill conditioned in the laſt degree, accompanied with that profuſe diſcharge of which the patient ſo often dies; there is an exfoliation of bones which ſeldom is completed in leſs than ſix months; and at the end of this tedious confinement, the patients go out from the military hoſpitals with ſtumps where the bone projects, covered with a thin cicatrice, ſeldom without ulcer, or at leaſt ready to break out into ulcer with any rude touch; ſuch as reminds them every moment of their loſs and of their unhappineſs. —During the whole of ſuch a cure, we have to be as watchful of bleedings, as diligent in extracting and cutting the diſeaſed bones, as anxious to keep off fever, and prevent the diarrhœa or the gleeting from deſtroying the patient, as even in the ugliеſt fracture of a limb; and yet without the comfort of preſerving a limb, which, however awkward, would be much more uſeful than a conical and tender ſtump. There remains but one thing to complete the view of this caſe, and I ſay it boldly, that even this imperfect cure is ſeldom accompliſhed till after labouring thus, through every danger, for four, five, or ſix months; and I appeal to the writings of Belguer himſelf, who ſeems as proud of ſuch a diſtreſſing ſcene, as if all were well and eaſy with the patient! Even this is what he boaſts of as one example of his ſucceſs!

I have now explained to you all the varieties of wounds in the limbs; the wounded joint, the lacerated artery, the bones fractured and luxated, and the whole limb carried away: Nor was it poſſible for me to explain the practice in theſe ſeveral accidents, but by repreſenting the dangers of each caſe. I have been guided by no ſecret deſign of exaggerating the difficulties of ſuch wounds; and yet the ſimple truth cannot but impreſs your imagination very ſtrongly. It is, indeed, a ſcene which muſt alarm you, and make you ready to pronounce: "There is no way ſurely of ſaving our patient, but cutting off of ſuch limbs." But that you may be warned againſt all haſty concluſions, that you may have all reaſonable hope and confidence in the powers of nature, I ſhall deliver ſhort notes of a few choſen caſes; they will prepare your mind with knowledge, for the great queſtion which I propoſe next to explain to you; I mean, Whether, in ſuch diſtreſſing circumſtances, the limb ſhould be cut off or not?

You will not be ſurpriſed, to find me begin with relating the ſucceſſes of Mr. Belguer; for you have heard of his great name.—He was chief ſurgeon to the laſt King of Pruſſia, and had the command of all his hoſpitals. He had ſeen the ill conſequences of amputation in the former years of the war, and reſolved, that, from the date of his authority, not one amputation ſhould be performed; and accordingly, from the date of his command, not one amputation was performed in all the Pruſſian army. Full 6000 wounded men were left to ſink or ſwim; for, how

much ſoever a leg or arm might be lacerated, amputation was not allowed; if ſuch a limb could be cured, it was cured; if it gangrened, the gangrenous maſs was ſcarified and ſcraped away. If there was an entire ſphacelus, and the leg fell off, the Pruſſian ſurgeons did no more than merely ſever the dead bones from the half dead fleſh, leaving the rotten ſtump to heal, if it could heal.

Now, when all the wounded of a camp are left thus, with wounds of all kinds, to take their fate, to live or die, it is no wonder, though ſome very ſingular cures appear; and, therefore, there is no book which we ſhould ſooner look into for miraculous cures, than that of Mr. Belguer.

Mr. Belguer conducted himſelf through his plan with a wonderful perſeverance, and ſtood out ſcenes of diſtreſs, which I ſhall repreſent to you by and by; at preſent, it is rather my buſineſs to preſent you with ſome examples of his ſucceſs.

He cured a ſoldier, whoſe arm was ſo miſerably torn by four grape ſhot, that the humerus was broken in the middle. There was an anueriſm, as big as a fiſt, at the bend of the arm; but whether of the main artery or not, he does not ſay. The wounds were dilated, the broken bone laid bare, ſeveral large ſplinters taken away, and the remaining ſplinters ſmoothed and applied to each other, by moulding the arm with the hands, and rolling it with a gentle bandage, moiſtened with ſpirits of wine. He laid thick hard compreſſes, and a tighter bandage, over the a-

nueriſm; and thus, without further help, he performed the cure in three months.

He gives, next, another caſe of leſs importance, of a wound of the fore arm, cured by the ſame proceſs, of dilating the wounds, and extracting all the fragments of bone.

Next, one of an officer, who was wounded with a ball in the middle of the leg, had betwixt three and four inches of the bone cut away, and yet was healed.

Next, of a ſoldier ſo wounded in the leg, that Belguer cut away no leſs than five inches of the tibia, and picked the ſplinters of the fibula away, put the bones together, and accompliſhed the cure, though not without a great ſhortening of the limb.

Next, of a nobleman of the name of Franckenberg, who was ſo wounded in the foot with a muſket ball, that his ſurgeons hooked out, in a manner, all the bones of the foot, and yet he recovered ſo as to walk with a high heel.

An enſign recovered from a wound, with fractures of the leg.

A foot ſoldier, of the name of Micke, had his arm ſo battered by a cannon ball, two fingers breadth below the ſhoulder joint, that five inches of the os humeri were taken away.—Yet, in nine months he recovered, but was ranked as an invalid.

An officer having received a wound, or rather a bruiſe, very like this, was cured in eight months.

Two officers, who were wounded in the ſhoulder joint, were cured in about ten months.

A gentleman, of the name of Britzke, who was wounded with a muſket ball in the elbow joint, was cured in two years.

The caſe of one of his princes brings up the rear:—He had been wounded in the foot, at the root of the metatarſal bones; and though the bones of the tarſus were much broken, he was, by inciſions and balſams, reſtored to the troops.

Of 300 who were wounded in the limbs, and with fractured bones, theſe are the examples which Mr. Belguer has choſen as ſurpriſing cures.—But how naked and bald of circumſtances theſe caſes are, I need not explain to you;—you muſt feel that from a want of detail, they are but ill calculated to make any laſting or lively impreſſion on your minds; but the bareneſs of theſe caſes will be compenſated by the intereſting nature of others, which I ſhall now relate.

M. Boucher, a French ſurgeon, cured a young man of nineteen, of a vigorous conſtitution and ſound health, who was ſhot with a muſket, at ſo ſhort a diſtance, that the ball, paſſing clean through the thigh-bone, wounded a woman, who ſtood near him, in the foot. The thigh bone was broken juſt above the condyle; it was ſo ſhattered that about four inches of it were taken away in ſplinters: The ball did not injure the artery, nor touch the joint; but the man being drunk, did himſelf much harm in attempting to riſe. On the following day, there being much ſwelling, fever and pain, amputation was propoſed to him; but he refuſed to hear of the operation, and his ſurgeons were bound to do their beſt to ſave his life; they took

away many ſplinters of bone, dilated more particularly the backmoſt wound, that the matter might be more freely diſcharged: There followed three ſuppurations around the knee, but none of them apparently affecting the joint; the openings for theſe abſceſſes diſcharged more ſplinters of bone; the inflammation ran high, gangrene came on; at laſt, a line of ſeparation appearing, dividing the mortified from the ſound parts, amputation was now a ſecond time propoſed; but the conſultants could not agree:—A ſlow fever and diarrhœa waſted him for a month longer; but ſtill he lived. Now, in the third month, new ſuppurations appeared in the upper and inner part of the thigh; another collection of matter formed under the faſcia lata on the outſide and top of the thigh. Theſe abſceſſes were freely opened, and diſcharged ſome more bones; the ſuppuration, notwithſtanding the patient's irregularities, went on well, and in ten months the abſceſſes were entirely healed. Then the bones knit with a firm callus, the joint played freely, the limb was ſerviceable and ſtrong; it was ſtraight alſo, but it was four inches ſhorter than the other, which was exactly the extent of the wound in the bone.

In this caſe, the bone only was wounded; there was no wound of the joint, no hurt of the artery; and yet the cure was not accompliſhed till after ten long months of ſuffering, with fevers, diarrhœa, painful ſuppurations, and profuſe diſcharge.

Mr. Theri attended one of the ſervants of a monaſtery, who, while holding the bridle for one of the religious, was wounded by his piſtol going off as he

was mounting. The wound was in the elbow joint. The ſhot ſtruck the condyle of the os humeri, and carried off alſo the olecranon. The uſual inciſions were made; but the ſwelling was ſo great by the fifth day, that his ſurgeons were obliged to make new inciſions of the wound; they were moreover obliged to cut up the faſcia of the fore arm. The inflammation, ſtill advancing, extended quite to the ſhoulder, and threatened gangrene: The ſcarifications, bark, and ſtimulant applications, ſaved the arm from total gangrene; but after this, abſceſſes formed all round the fore arm: But theſe ſufferings and dangers being over, the patient was cured in eleven months: It is very ſingular, that by the uſe of baths he recovered even the uſe of the joint. In this caſe, as the gangrene was actually begun, the patient made a narrow eſcape.

An officer of the Iriſh Brigade, alſo wounded in the elbow at the battle of Fontenoy, had the lower part of the ſhoulder bone fractured with the muſket-ſhot, and the olecranon much damaged, though not entirely ſhot away. He alſo ſuffered ſuch dangers, that he was condemned by his ſurgeon, Mr. Guerin, to ſuffer amputation, and had given his conſent; but, prevailed on by the tears of his wife, he retracted this promiſe. He alſo was ſaved from gangrene by the ſcarifications and other means; the dreſſings were thoroughly ſoaked with a bloody ſerum, which augured no good, and many ſcales of bone were diſcharged before his ſurgeons could accompliſh the cure; the cure alſo was leſs perfect, ſince it was not accom-

pliſhed but with a ſtiff joint. The period of this cure is not recorded, but we ſee that he eſcaped from great dangers even in the firſt inſtance; and we are told by the author, that his cure was tedious and very painful.

Mr. Boucher cured alſo another young man wounded in the thigh bone. The ball had paſſed through the condyle; but ſo tedious was the cure, that, during his confinement, the other leg grew ſo much, that though the wounded thigh bone was touched only in the condyle, and nothing abridged of its length by the fracture, the young man, by the growing of the ſound leg, while the wounded one continued ſtationary, had a great halt in his gait. This young man, you will eaſily gueſs, muſt have ſuffered much to obtain this cure: There were firſt deep inciſions made into the two wounds, then many ſplinters of bone pulled away; then turpentine dreſſings were applied, and great pain and ſwelling, convulſions alſo coming on, they were on the ſixth day obliged to cut the ham-ſtrings, and to make long inciſions quite up to the middle of the thigh. Eleven months was the period of this young man's cure; and ſurely, in confinement, fever, and diſcharges of bones, he bought it dearly.

One man, recovered under the care of Mr. Boucher, who was ſhot acroſs from the inner to the outer ancle; and another patient had the head of the ſhoulder-bone broken by a ball; which, paſſing from behind, forwards, raked along the courſe of the clavicle, till it came out at the end of the clavicle, next to the ſter-

num. There were, in this caſe, ſhiverings, fever, and an ill-conditioned diſcharge. Inflammations and great ſuppurations extended quite down the fore arm, and he left the hoſpital not till after nine months diſtreſs, and with a fiſtula in the joint, which mineral waters cured at length, ſo that he could do every thing but raiſe his arm.

In beſieged cities, or in the trenches before a beſieged city, moſt of the wounds are from great ſhot, or by bombs, or by great ſplinters of ſtone; and, in ſuch wounds, the limbs are ſo miſerably broken, that in moſt of the caſes, amputation is neceſſary; and ſo well eſtabliſhed is this maxim, that Mr Cannac of the French Academy pronounces this opinion even while he is in the very act of relating one of the moſt wonderful recoveries that ſtands upon record. It is the caſe of an engineer who was wounded with a bomb; the bomb threw him down, broke the leg and foot, and ſo ſhattered all the bones, that the leg bended in one direction, the foot hung away in an oppoſite direction, ſeveral inches of the tibia and fibula were pulled away, and many pieces of the bones of the foot were diſcharged; and but a few days after this wound, the French being obliged to fly from the city, which was beſieged, were forced to carry him in this miſerable condition to Cambray. No wonder that, in the very firſt conſultation upon ſuch a wound, amputation was propoſed, and was freely conſented to; but, by many ſucceſſive accidents, it was deferred and deferred again, till the moment in which they were obliged to fly.—After various dangers (which, from what I have ex-

plained to you of ſuch caſes, it were very needleſs to relate), he did recover; but it was ſuch a recovery, that Mr. Cannac declares, that his long ſufferings and imperfect cure being conſidered, it had been better for him that they had cut off his leg; for it was ſhort, and deformed; and he ſuffered eight years of operations, dreſſings, and mineral waters: The patient was two years under the immediate care of his ſurgeons, and ſix years more wandering about watering places, with open ſores, and exfoliating bones. Eight years, in the flower of life, are a dear purchaſe even for a perfect cure.

The caſe, with which I ſhall finiſh theſe ſingular inſtances of ſucceſs, is that which immediately follows in Mr. Cannac's Diſſertation, and which he joins to this with great ſenſe and judgment; for it makes the leſſon complete. An officer in the ſame beſieged city was wounded in the ancle with a hand-grenade;—and, believing himſelf more frightened than hurt, he tried to walk out of the work which he commanded; but his leg was benumbed, and his ſoldiers were obliged to carry him out. The wound was merely a fleſh wound, an inch and a half in diameter; there was no wounded artery, nor any appearance of a broken bone, but it was of courſe a bruiſed wound. I need not relate to you all the ſymptoms, the tenſion, and ſwellings of the limb, the threatening of gangrene, the ſloughings and inciſions, all the ſufferings of the patient, and all that was done for him. The whole is told in one word: He had ſeen the officer, juſt mentioned, ſaved after a more terrible wound. Mr. Cannac propoſed amputa-

tion; but this gentleman refuſed, and his expectations raiſed too high, from what he had witneſſed in the other caſe, coſt him his life.

Thus have I given you a fair tranſcript of many wonderful cures; and the beſt comment, perhaps, that I can make on them, is delivered in the following ſentence of Mr. Boucher: "Decided as I am in writing againſt amputation, and great as my confidence is in the powers of Nature, I confeſs, that we ought not to look for miracles, nor truſt blindly to her powers. There are many caſes, where we can have no reaſonable expectation of ſaving our patient, but by cutting off his limb *." This is the great queſtion to which all the caſes above recited tend. It was to ſhow the dangers of amputation, that they were muſtered up by the French and Pruſſian ſurgeons, but every effort of this kind, if we take it in the right ſenſe, will but alarm us, and not quiet our minds. You have had theſe caſes tranſlated to you fairly and honeſtly. But in glancing your eye backwards, you ſee, in true perſpective, all the dangers of a nine months cure, which is but a weary travel, ſtep by ſtep, betwixt life and death. You have, in this view, the dangers of frequent fevers, waſting diarrhœas, foul and gleety ſores. You ſee ſome dying ſuddenly of gangrene, ſome waſted by the profuſe diſcharge, and ſucceſſive ſuppurations,

* Page 109.

new inciſions, unexpected diſcharges of ſpoiled bones; you ſee thoſe who recover, halting on limbs ſo deformed and cumberſome, that they are rather a burden than a help. You know, in the very moment that you hear of ſuch a cure, how much the patient muſt have ſuffered, and how poorly he has been cured; and you can, from the long ſufferings of thoſe who eſcape, tell, but too truly, how many muſt die.

From theſe reflections, you will be inclined to prejudge the great queſtion of amputation, or of ſaving the limb. But however you pronounce on that point, I beſeech you to learn the following humane leſſon, from the practice of theſe, the greateſt ſurgeons in France: When your opinion is called for, pronounce it boldly; and ſay, if you think it right to ſay ſo, this limb muſt be cut off. But when you are prevented by officious relations, or if the patient ſhould refuſe his conſent, when the accidents of the caſe interrupt you, or you are in an irregular and dangerous camp, where operations cannot be done, then do whatever remains of your duty, not with the ill humour of a man thwarted in ſome little view, or ſmarting under the ſenſe of a diſappointment or affront; ſet yourſelf heartily and kindly to ſave your patient's limb and his life.

DISCOURSE VIII.

ON THE QUESTION OF AMPUTATING SHATTERED LIMBS.

The beſt operations are ſometimes abuſed, and ſo is amputation abuſed: the moſt dangerous remedies are ſometimes required, ſo is amputation. I do not admire the reaſoning of thoſe who, through an affected confidence in the powers of Nature, are continually declaiming on her miracles, her wonderful powers, when they ſee hundreds dying around them on every ſide! Where is the deadly diſeaſe from which ſome few have not been reſtored? Theſe men have the talent of repreſenting one ſingle caſe as an argument againſt a general practice; they bring a few ſucceſsful cures into the full light, while their conſcience tells them that hundreds are dying in ſecret. Nor can I, on the other hand, reconcile myſelf to the practice of thoſe who are ſo proud of ſurgical operations, that nothing ſeems well done to them, unleſs it be done with the knife, I may ſay, by main force of ſurgery. Theſe ſurgeons ſet themſelves, not over Nature, to regulate or aſſiſt the operations, but above Nature, to controul and force them. Feeling as I do the danger of either

extreme, I ſhall endeavour to direct you in this difficult queſtion, Whether in certain circumſtances you ſhould amputate the limb, or try to ſave it? I ſhall endeavour to direct you to the ſenſible and modeſt plan of conduct; and lay before you ſuch rules, as will enable you to aſſume a conduct neither too timorous, nor too forward.

Allow me to ſay to you, firſt of all, that queſtions of practice ſhould be decided, not by authorities, for theſe are the opinions of men, of mere men; and we know too well how ſtrangely a man's opinions grow up in him, diſtorted by a thouſand accidents. But they ſhould be determined by reaſon and experience, which is the true baſis of opinion; for, after all authorities are laid down before us, ſtill the true ſpirit and reaſon of our rules remains in the nature of the thing itſelf: if we can once find out that reaſon, it muſt ſerve as the principle of our practice; and though opinions, authorities, and names, might put us wrong, that will never deceive us.

If there be a great fracture of the elbow or knee, who ſhall deny that the man may live and recover? But are there not a thouſand alarming reaſons to believe that he will die? If there be a fracture of the tibia and fibula, and if at the ſame time the great blood veſſels are cut, is it not poſſible that our patient may eſcape this terrible complication of aneuriſm, fracture, and bruiſed wound; may he not recover from the gangrene; may he not outlive the diarrhœa and profuſe diſcharge; may not the fever be kept under: but ſtill the queſtion comes upon us, may he

not rather die? Then, if ſo, it is the duty of the ſurgeon to pronounce, that though he may live, there are many chances that he may die; and though fifty recoveries ſhould be produced from books, that would not bias his judgment. He knows all the dangers, and fears them, and adviſes amputation; but if it be refuſed, he is not offended; and as he feared theſe dangers, he rejoices if his patient eſcape from them.

The ſetting up exceptions as an argument againſt general rules, is very poor reaſoning; ſince every exception does in fact prove its own rule. This manner of reaſoning is moſt dangerous to the young ſurgeon; it hurts his mind, makes him irreſolute and timorous, where he ſhould be moſt decided and bold; obedient to the ignorant fears or wiſhes of his patient, when his patient ſhould rather be ſubmiſſive to him, confident in his judgment, and contented with whatever he reſolves. Does not Mr. Boerdenave himſelf, the chief of thoſe who have argued againſt amputation, acknowledge to us, that ſuch ſucceſsful caſes are deceitful? He concludes a long liſt of wonderful cures, with this remarkable ſentence: "I know well how many examples are related of wounds of the bones and joints cured without amputating; but thoſe examples, ſeducing to ſuch only as are little converſant in practice, never can eſtabliſh a general rule *." General rules and particular exceptions are oppoſite, and yet neceſſary to each other, like light and darkneſs, without the one the other cannot be diſtinguiſhed.

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I ſhall go once more over the points of practice which I have lately enumerated, taking them up in their order, of a ſhattered ſtump, fractured bones, wounded arteries, and open joints.

I. OF SHATTERED LIMBS.

Mr. Belguer, in the very ſecond paragraph of his book, declares, that he had often cured thoſe, who, having the leg or arm ſhot away by a great ball, would, according to the common practice, have ſuffered a regular amputation of the ſtump. Now, if Mr. Belguer means to ſay, that it is better to clip and pare ſuch a ragged ſtump than to cut it off, his opinion amounts to this plainly, "that the lacerated ſtump left by a cannon ball is as good a ſtump as one made by a regular amputation, is even leſs dangerous;" and it would follow, if this were true, that all our trouble about neat amputations were very fooliſh; why indeed ſhould we not return to the old method of Botallus, namely, by the guillotine, for that would make a clean amputation, as quick, and with almoſt as little pain as even a cannon ball; but it would leave a ſtump, I fear, little better than thoſe which Belguer would palm upon us for good ones. Although, after all, partly from modeſty and conſciouſneſs, perhaps from prudence and a fear of contradiction, he does acknowledge to us, that he cured ſuch ſtumps only ſo ſo, "ſatis quidem pro noxæ ratione feliciter curato."

But although Belguer had ſaid boldly, without this qualifying expreſſion, that he had eaſily cured ſuch ſtumps, he could not have been believed. We muſt examine every ſuch point, no doubt, by authority in the end, but firſt of all, by the nature of the fact itſelf.

I aſk whether it be in the nature of things that we can bring into the condition of a ſound and healthy ſtump, ſplintered bones ſplit up to the heads, joints ſhaken and bruiſed, ragged muſcles, and ſtrings of tendon and ſkin hanging round the ſtump, and a whole ſurface ſo nearly in the condition of proper gangrene, that it hardly can eſcape? How ſhall we take up arteries which cannot bleed, but which are ſoon to fall into gangrene and bleed when we are leaſt prepared? How ſhall we reſtore to any ſound condition, parts ſo deſtroyed in their form, and ruined in their texture, and in their vital powers, that they can be cured only by ſloughing, i. e. by gangrene? How ſhall we clip this ſtump into any ſhape, or pick away the looſe bones, or roll and compreſs the ſplit ones as Belguer directs, without operations more painful and far more tedious than actual amputation?

If there be much difficulty in healing a regular and good ſtump, what muſt not the danger be of ſuch a ſtump as this? Where no veſſels bleed, where none are tied, where, in the courſe of the ſloughing, dangerous arteries will burſt out, where a ſtump already ill formed and irregular, muſt ſtill loſe ſomewhat of its ſubſtance by the ſloughing of the bruiſed fleſh. Indeed, in ſuch a caſe, a conical, ulcerated, and painful ſtump will be the only reward for long ſuffering, and

many tedious exfoliations or ſawings, perhaps, of the fractured bones. No wonder that we have ſuch a modeſt declaration from Belguer, we cured ſuch ſtumps ſays he, in four or five months, "ſatis quidem feliciter pro noxæ ratione;" or in plain Engliſh, as well as we could, conſidering what ugly, lame, painful, and uſeleſs ſtumps they always make.

Whether it be the pompoſity of his language, that has deceived us, I cannot tell; or whether the world be too willing, as I fear it is, to truſt to bold aſſertions, though ſupported with but ſlender proofs: yet ſo it is, that Belguer has got credit for all that he has ſaid, and for much more than he has done. His aſſertion is, that he had cured a great many who had their limbs entirely ſhot away, this we find in his ſecond paragraph: but preſently after, comes a long hiſtory of the miſeries which theſe poor wretches ſuffered during their confinement of ſix months. Theſe accidents, as he calls them, (though I fear they are rather too frequent to be explained honeſtly by this old name of ACCIDENTS); theſe accidents I ſay, are enumerated in his twenty-firſt paragraph, where we are told of the manner of pulling away the rotten bones at every new dreſſing; of balſams for preventing an exceſſive diſcharge; of pulling the bones when they do not come out of the ſtump; and of ſawing them off, when we find that we cannot pull them out; of bark and ſoups, and diets for ſupporting the ſtrength; of fevers and of febrifuge drugs; and of the ugly changes that come upon the ſtump, when the fever comes on.

But the winding up of his ſubject is the moſt cu-

rious of all, where he tells us*; "Concerning theſe ſame lacerated legs and arms, when the member is torn away from the body, I muſt add, that as far as I know, not one of thoſe who had loſt the thigh, were brought into our hoſpital; I have little doubt but that every ſoul of them died of bleeding. Some, indeed, of thoſe who had the arm blown away, were ſaved by the ſurgeon's tying the arteries and dreſſing them upon the field of battle."

So that after the faireſt examination, Mr. Belguer's ſucceſs goes juſt thus far and no farther; that all thoſe who had the thigh carried away, died of bleeding; that ſome of thoſe who had the arm carried away were ſaved; that many of thoſe who were thus ſaved, after loſing the arm, or of thoſe who loſt ſmaller parts, as the hand, or fore-arm, or foot, were cured as well as could be expected, "ſatis felicitèr pro noxæ ratione," after five or ſix months confiement; and as for the fevers, diarrhœas, carious bones, and profuſe diſcharges, the ſhape of the ſtumps, and their value to the poor fellows; all this muſt be left to the imagination of his reader: and though the imagination be not indeed a calculating faculty, it is the only faculty we have left us for repreſenting the proportions of theſe cures; ſince Mr. Belguer, although he tells us when he entered upon his duty, how many wounded he had, and how faſt they died in former years of the war, and how eaſily he ſaved them by the new plan, has yet never condeſcended to number the ſtumps which he left upon the Pruſſian eſtabliſhment.

Thoſe, ſays Mr. Martiniere, who thus declare againſt amputation (in ſhattered ſtumps) do make the very worſt kind of amputation. Mr. Ranby was ſo intent upon preventing theſe dangers, and on having theſe amputations early performed, that he adviſes the ſurgeons of ſeveral corps to collect themſelves into ſmall groups, and plant themſelves behind the line, in forming for an engagement; and indeed, tents are uſually prepared, where all ſuch ſudden operations may be performed upon the field.

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2. OF FRACTURED BONES.

These ſhattered ſtumps are nearly an epitome of all the dangers which aſſail us in the caſe of a wound with fractures of the bones; for there we find, as in this caſe, tedious exfoliations, diarrhœas, fevers, and profuſe flux of ſerum or pus; but great as theſe dangers may be, they have no influence on the ſpirits of thoſe who are bent up to a doctrine; and accordingly Mr. Belguer never cut off one ſingle leg nor arm. He had ſeen the ill ſucceſs of amputation in the former years of the war, and was reſolved he would not allow of an amputation, no not one, however dreadful the caſe. His enthuſiaſm could not perhaps be told but in words which muſt ſeem ſplenetic and raſh; but to avoid any feeling of this kind even in my own mind, I ſhall ſimply tranſlate his paragraph.

"The ſecond caſe in which ſurgeons uſually amputate, but which I have always cured, is that where

a muſket-ball, grape, granade, or any piece of iron, ſtone, &c. broken by ſhot, wounds the bones of a foot, or hand, or leg, or arm, ſo that they hang from the reſt of the member looſe and vaccillating." (He repreſents the foot or hand as abſolutely dangling; "tam miſerere contuſa ut huc illuc labet pendeatque," p. 43.) This is the mere enthuſiaſm of the thing; and when we find a ſurgeon pretending always, or almoſt always, to cure ſuch wounds in which a foot or hand are left dangling from ſide to ſide, "huc illuc labentes atque pendentes," we are bound to examine into the nature of ſuch wound, and try whether the nature of the thing and this bold teſtimony will agree.

When a gentleman, falling from his horſe, has broken his leg, and there are projecting bones, though he is carried ſoftly to town, laid in his own houſe, has the happineſs of his friends around him, and the advice of the beſt ſurgeons, ſtill we are not without our fears. But when a poor fellow is wounded, who, by the duties and hardſhips of a military life, and all the fatigues of a long campaign, is become ſickly and weak; when his knee is wounded with a muſket ball, and all the bones are broken; when his leg is ſo fractured by a cannon ball, that the bones are reduced to ſplinters, for the length of many inches, and the muſcles and extravaſated blood lie like a mixed and gangrenous maſs below the ſkin; when to theſe injuries are added, perhaps, lacerations of the chief arteries, what can we do? Is this a caſe to be cured in any circumſtances? Is it to be cured in an hoſpital, where, as Belguer himſelf tells us, there are miſerable beds, ſcanty food,

and poor clothing; where there is nothing but cold and naſtineſs, uncleanlineſs and infection, and putrid ſores; where new crowds of wounded pour in upon them after every battle, with tales of misfortune or ſucceſs always agitating, ſometimes alarming? There is, in ſhort, no kind of wretchedneſs that is not ſeen here, and none which Belguer does not freely acknowledge. Is it then to be believed, that a man thus wounded, can be ſaved, after being thrown into this charnel-houſe, amidſt the cries of the dying, the ſights of the dead, and all the horrors of infection? What is it that Boerdenave means, when he declares, "That theſe tales of ſucceſs are ſedueing, only to thoſe who are not ſkilled in practiee." Surely, he means by ſkill in practiee, a knowledge of the manifold dangers which attend on ſuch a wound; he muſt mean, the knowing what fate awaits thoſe whom we ſhall attempt to ſave; ſuch a ſcene muſt be witneſſed too often in the beſt regulated hoſpital; but where (as in the Pruſſian hoſpitals) no limbs are cut off, the ſeene muſt be dreadful indeed. If all limbs be preſerved many muſt gangrene; if no amputation be performed, all the ſhattered ſtumps muſt gangrene; then the ſloughing ſtumps and gangrenous limbs, the exfoiliating bones, long accompanied with a ſerous and putrid diſcharge, muſt infect the whole, ſo as to make the hoſpital a lazar-houſe of ſtinking ſores. There, as Belguer acknowledges, diarrhœas, dyſenteries, fevers, and all kinds of diſeaſes prevail; and there is often a ſudden changing of the wounds, and a ſudden changing of the health alſo, which he finds it difficult to fight againſt,

with his bark and wine; and I fear there were often ſudden changes of another kind, which he is too unwilling to confeſs. If every ſtump took five months in being healed, and every fractured limb endured a nine month's cure, you may conceive more eaſily than I can explain to you, the emaciated ſqualid figures of ſuch an hoſpital, ſtriving to raiſe themſelves in their beds; and the miſerable condition of thoſe, who, after ſuch a nine month's cure, crawled out of ſuch an hoſpital, as if riſing from their tombs. If this be what Boerdenave means by ſkill in practice, we may, with great ſecurity, add Mr. Ravaton's aphoriſm to his warning, and ſay, "Wherever the thigh bone has been entirely broken (by a ball, viz.), I have ſeldom ſeen the patient ſaved." And we may add alſo that of Mr. Boucher's, who, though himſelf an enemy to amputation, allows, "that the limb muſt be cut off; whenever a great bone, as the thigh bone, tibia, or fibula, is broken with deep fiſſures, or with projecting points of bone, which we cannot cut away, or where ſuch bones are broken in ſeveral places; or where the head is broken from the body of any of thoſe bones, nothing but amputation is to be looked to." He allows, alſo, that the ſymptoms, during the cure of ſuch a wound, may require amputation; as twitchings of the member, ſuch as are in danger of being communicated, and ſo cauſing general convulſion; caries of the whole thickneſs of a great bone; flabby ſores, ſerous and profuſe ſuppurations; and, finally, gangrene, in which it was never doubted, that amputation was the ſole reſource. And a great ball cruſh-

ing the bones of the leg, or diſordering a great joint, as the knee, though it ſhould merely fall upon it by its own weight, ſurely cannot be cured but by amputation." Mr. Boucher acknowledges juſtly, "that whatever the dangers of amputation may be, yet we know, that there are certain caſes where it cannot be avoided *." Mr. Kirkland's rule is a ſenſible and correct one: "That in compound fractures of the long bones of the extremities, we ſhould act on the ſide of probability; if there be a probability of ſaving the limb let it be ſaved; if there be no hopes of a cure without amputation, let it take place without loſs of time." The wonderful recoveries which Mr. Kirkland has recorded, after the cruſhing of limbs, by waggon wheels, are inſtructive and encouraging; we ſhould venture almoſt any thing in fractures of that kind; but when made by a cannon ball, and complicated with much ecchymoſis and wound, the danger is more preſſing.

3. OF A WOUNDED ARTERY.

With a wounded artery, we know how hard it is to perform a cure in any caſe; but in a caſe of wounded artery, with the complication of ſhattered bones, a bruiſed wound, a riſing fever, and a ſwelling of the wounded limb, I venture to ſay it is next to a miracle, if the patient eſcape gangrene. Such a wound

* Page 311.

is like that recorded by Kirkland, of a poacher who was ſhot in the arm with a horſe-piſtol loaded with very large ſhot, the mouth of the piſtol almoſt touching his arm: The humeral artery was torn to pieces; the laceration of ſuch a wound prevented bleeding, but the whole arm being violently bruiſed, gangrene came on; and when Mr. Kirkland ſaw him on the third morning he was dying of the gangrene.

Thus, in aneuriſms, ſays Mr. Kirkland, "Amputation may, or may not be required, according to the accidents of the caſe." In a ſimple aneuriſm, as from bleeding, there can be no doubt of ſaving the limb; but this complication of aneuriſm in a great trunk, with a lacerated and fractured limb; or, in plain terms, a gun-ſhot wound, with a lacerated artery, is the very caſe which can hardly be ſaved. If we enter at all into debate upon the queſtion of cutting off a fractured limb, without any wound in the artery; ſurely the queſtion ſhould be very eaſily reſolved, where that alſo is added to the other dangers? If the artery merely be wounded by one ball, or one ſlug, though it were the femoral artery, as in the caſe of the gardener recorded by Deſſault, even after ſuch wound in the femoral artery, we may ſave the limb; but when, as too often happens, the bone and the artery are both wounded at once, the patient can hardly be ſaved.

4. OF A WOUNDED JOINT.

As for a wounded joint, take the united experience of all ſurgeons which has eſtabliſhed this, as the true prognoſtic, that "WOUNDS of the JOINTS are MORTAL."

Hippocrates ſays, that wounds of MEMBRANOUS PARTS are mortal. Now what Hippocrates meant by this, is very plain: He judged theſe parts nervous; for the old phyſicians had confounded the idea of membranes and nerves; and wounds of the white or membranous parts were thought to be ſtill more dangerous than the wounds of nerves. Here then we perceive, that this old aphoriſm is a doctrine, not a fact: But when a modern ſurgeon ſays, wounds of the joints are mortal; he does not put forth his hypotheſis, he merely declares a fact which the concurring teſtimony of all ſurgeons confirms. He knows, that a raſh inciſion into a joint will, like an accidental wound, occaſion a very painful and ſudden death; he knows, that a mere cut upon the joint, through its capſule, is a terrible accident, independently of fractured bones, or a great laceration; but that if theſe be joined, the patient can hardly eſcape: And ſuch is his faith in this aphoriſm; he ſees it ſo often confirmed by experience, "that wounds of the joints are mortal," that, inſtead of ſeeking to lay down proofs of this danger, a writer leaves it to the recollection and experience of every ſurgeon; he dwells upon ſome hopeleſs caſe, which he or his friend has had the good fortune to cure; inſtead of accumulating uſeleſs proofs of an acknowledged principle that ſuch

wounds are mortal, he gives rather exceptions, knowing that, according to the lawyer's adage, "exceptio firmat regulam," that the exception but confirms the rule; though, what he means to record as a mere exception, is too often underſtood by the ſtudent as an imperfection in the general rule, and the very report of the exception throws him back into a heſitating and uncertain ſtate of mind! Thinking only of this wonderful recovery, he willingly forſakes an uncomfortable rule, to lay hold on this one glimpſe of hope, while indeed, if he reaſoned fairly, he would perceive that the exception ſhould be loſt in the fulneſs of the general rule, and not the general rule diſturbed by the exception *.

* The young ſurgeon never ſhould allow himſelf to forget how this confuſion comes about. There is no difference of opinion, for no one is giving an opinion; every ſurgeon in the kingdom delivers into ſome valuable repoſitory the accidents of his practice, the wonderful recoveries thus riſe up to the ſurface, while all the miſcarriages ſink down to the bottom, and are never more heard of; ſo that wonderful recoveries are every where ſoliciting the ſtudent's attention, almoſt every caſe he reads is an exception to ſome general rule; while there is no ſyſtematic writer buſy in ſupporting and ſettling the general rules, or in confirming and eſtabliſhing them againſt this hoſt of exceptions: Wounds of the heart, wounds of the pericardium, wounds of the bowels, wounds of the bladder, wounds of the ſtomach, wounds of the brain, wounds of the great arteries, wounds of the joints, are all mortal; and yet the liſt of exceptions, that might eaſily be extracted from the indexes of caſe-books and collections, is endleſs. Let not theſe move the judgment of a young man, when he firſt enters upon the practice of his profeſſion; and, when he is old, he will have no need for caution like this; general rules will then have got the due aſcendency in his mind, theſe little exceptions will have fallen to their right level.

There is one repreſentation ſtill wanting to complete the diſcuſſion of this ſubject:—It is the ſad condition of ſoldiers, with whom too often their wounds, as wounds, are but the ſmalleſt part of their danger.

Thoſe who have been much accuſtomed to ſee men conveyed wounded from the field, with lacerated arteries and broken limbs, declare to us, that their cries and ſufferings are moſt affecting. The army, indeed, which goes onwards, leaves its wounded ſafe behind; but, in retreat or flight, and, after a day of fighting, which is a day of fatigue, what muſt be the condition of thouſands left upon the field, or thrown in heaps upon waggons or carts, and hurried along the roughеſt roads, from poſt to poſt, with bleeding arteries and ſhattered limbs, and with points of bone piercing the fleſh, and exciting at every ſtep of this terrible journey, the moſt dreadful cries? Some fainting with loſs of blood; others writhing with pain, many delirious, and many ſuffering under the convulſions and agonies of immediate death. There the officers, and ſoldiers, the dead, and the dying, all thrown together in waggons, are put down in the neareſt hoſpital to take their fate: But if this retreat be continued, they are again taken from their bed of ſuffering, and often, even in the firſt movements, they faint and expire! If horrid war muſt not ceaſe, ſurely it were for the honour of human nature, that ſome proviſions were made, ſome mutual terms entered into betwixt contending nations, for the honourable treatment of the wounded. Army ſurgeons have long ſtrived to invent ſome means of conveying their patients more ſafely, but all in vain: A

rude ſquare box was preſented in the Academy of Surgery of France, invented by one of their greateſt ſurgeons, La Faye;—others were invented by Mr. Gooche, having circles and buckles,—and ſprings very ingenious, and ſurely, in ſome caſes, very uſeful; and this alſo (of conveying fractured limbs ſafely) is the chief uſe of Mr. Wathen's SPLINTS, which are perhaps the moſt ſimple and manageable, and moſt convenient of all theſe machines. Perhaps the conſtruction of waggons, with hammocks ſlung in them, might be ſtill more uſeful; but move them as tenderly as we may, we ſhall ſtill hear the ſame lamentations that Ranby makes, about "the cruelty of conveying wounded men away under all the miſeries of lacerated limbs and bleeding arteries." To ſuch ſufferings, there cannot fail to ſucceed ſpaſms and fevers, inflammations and gangrenes, with all ſuch diſorders of the general ſyſtem, or of the wounded limbs, as muſt render vain every attempt to ſave either the limb, or the life of the patient.

Thus you will foreſee an argument of neceſſity as well as of choice, and that limbs, which in happier circumſtances might have been preſerved, muſt often, in a flying army, or in a dangerous camp, be cut off. It is leſs dreadful to be dragged along, with a neat amputated ſtump, than with a ſwoln and fractured limb, where the arteries are in continual danger, from the ſplintered bones, and where, by the leaſt rude touch of a ſplinter againſt ſome great artery, the patient in a very moment loſes his life.

When we caſt an eye over this long catalogue of

dangers, and conſider the hardſhips and miſchances of a ſoldier's life, we ſee plainly that in the caſe of gun-ſhot wounds, in camps and hoſpitals, many limbs muſt be amputated, which, in private practice, might have been ſaved. And we cannot but be ſurpriſed when we firſt hear army ſurgeons declaring, that they never amputate, however deſperate the caſe. But when we look into the records of their practice, we find them driven into this extreme by abſolute want of ſucceſs, whenever they performed amputation. To what cauſe we are to trace this want of ſucceſs, it is not eaſy to determine; perhaps to operations ill performed,—perhaps to operations done at improper ſeaſons,—a thouſand accidents may affect this point, and we have the comfort of knowing, that this want of ſucceſs is not univerſal;—Mr. Belguer ſays, "My chief motive for refuſing to perform amputation was, that I had obſerved, that in the former years of the wars, *all* died who had their limbs cut off." Why, ſurely if all died who had their limbs cut off in the former years of the war, Mr. Belguer could not have done otherwiſe than as he did, i. e. to leave all thoſe, wounded with gun-ſhot wounds, to take their chance, to live or die *.

* "Jam cum ex tot vulneratis, quibus per priores belli annos ob graviſſima vulnera artus refecti ſunt, vix unus, alter ne vix quidem, ſervatus ſit; ſine errandi periculo poterimus conjectare, haud dubie maximam horum, quos neglecta membri amputatione ſanitati reddidimus, vitam ſanitatemque cum morte commutaturos fuiſſe, ſi vulnus, quod Chirurgus, artum præſcindens, facit, ad vulnus, in acie acceptum, acceſſiſſet." Dr. Ferriar obſerves, "that truth diſtils but very ſlow through Teutonic Latin."

The French ſurgeons, during the war of the 1746, declare with one voice, that "of thoſe who had their limbs amputated, two thirds ſurely died."

To this we have only to ſay, that if, in the Pruſſian camp, every man who had his limb amputated died, that is to be the rule of the Pruſſian ſurgeons. If in the French military hoſpitals, not leſs than two thirds died, then let that be the rule and vindication of the French ſurgeons; but the rule of the Pruſſian ſurgeons was not to be the rule of the French ſurgeons, and the rule of the French ſurgeons is not a rule by which the Britiſh ſurgeons are bound to abide. And the amputations of the year 1745, are, I believe, very unlike thoſe of 1795.

In that war, they did not even attempt to perform the amputation by double inciſion, but cut directly to the bone; they never, even in the moſt favourable circumſtances, could peform their cure under four, five, or ſix months. We find their patients dying of hæmorrhages, on the fifth or ſixth days. We find them performing their amputation in the time of fever and irritation, or in the midſt of camp diſeaſes. Surely, then, it had been eaſy to foretel what would be the iſſue of practices like theſe*.

But proofs of theſe miſdoings are required; and I will not leave you under that ſlight impreſſion that

* Mr. Lucas ſays, of not leſs than ſixty or ſeventy amputations done in our hoſpital, not more than four or five have died; and this is indeed the ſuperiority which the neat amputations, and the ſpeedy adheſion procured by Mr. Lucas, Mr Allanſon, and their friends, in that part of the country, muſt give them.

my bare aſſertions may make: The operations upon which the French ſurgeons have reaſoned, were thoſe which were performed after the battle of Fontenoy; and my remarks are, 1ſt, That theſe amputations were not performed abſolutely upon the ſpot, as in a beſieged city, in trenches, or in a ſhip of war. The ſoldiers were hurried away to the hoſpitals of Doway and Liſle, and there theſe unfortunate operations were performed. 2dly, That they were performed after the pain, fever, or convulſions had come on; for Mr. Faure ſays, "the earlier you amputate, the ſooner you condemn your patient to die; for death muſt be the conſequence of performing operations in a ſyſtem diſordered and troubled, and in a febrile ſtate, from the accidents of the wound." This he ſays in alluſion to the amputations performed after this particular battle. Nay, this of amputating in circumſtances like theſe, was not done merely through neceſſity; it was common doctrine and practice with the French ſurgeons. Boerdenave ſays, "If convulſions, ſpaſms, and other ſymptoms come on, and if inciſions, dilatations, and the extraction of foreign bodies do not appeaſe them, unqueſtionably we muſt amputate*." "Or if in conſequence of the acute continual pains, there come on convulſions of the part, which even the cutting of the tendons acroſs does not appeaſe, then we muſt perform amputation †." If the French ſurgeons were buſied in the midſt of fevers and other

* P. 234. N. B. Mr. Faure repeats this at page 237.

† Mr Boucher, p. 312.

bad ſymptoms, and what is worſe, dilatations and extractions of foreign bodies, in performing operations which ſhould be thought of only when all theſe diſorders are quieted, we ſee in that pieee of miſeonduct, one cauſe of their ill ſueceſs.

3dly, That they performed their amputations but poorly, is plain from what Mr. Boueher entitles, "A liſt of our ſucceſſes by amputation, in our hoſpital of St. Saveur;" in his liſt of nine patients, one had his arm amputated on the fourth day; ſurely this was not the moſt favourable moment; another had amputation performed ſix days after the battle; another on the fourth day, the ball remaining in the knee-joint, and he died; one died the fourth day after amputation, whieh looks as if there had been ſomething wrong in the operation itſelf; a eaptain of the regiment of Dillon died of the bleedings the eleventh day after the amputation; and yet of theſe nine ſubjects they ſaved four. Even by their liſt of ſueeeſſes, it appears that ſome had died of hæmorrhagy, and of eourſe, that the operations were ill performed; and in this ſame liſt, Mr. Boucher records the dates of two eures only, the one is of an amputated arm, eured in five months, the other of an amputated leg, cured in ſix months. We are told, moreover, that at this battle of Fontenoy, there were few ſurgeons; ſo that many loſt their lives by the amputations not being perſormed till they eame to the hoſpitals, when it was too late: it is very likely alſo, that where the ſurgeons were ſo few in number, they could not be very good.

Then, ſurely, in this affair of the expedieney of am-

putation, we muſt, in order to do juſtice to the queſtion, contraſt the operations of 1745 with thoſe of 1795. Thoſe were ill performed;—ſome died on the fourth day; ſome died of hæmorrhagy; ſome died languiſhing under the gleety diſcharges of conical and ill-conditioned ſtumps; and none of them were cured under five or ſix months of ſuffering and danger: Whereas, our ſtumps, inſtead of being open for five or ſix months, are more frequently healed by adheſion in five or ſix days; and this quick adheſion, though it be not perfect, will almoſt always be ſuch as to prevent the bleedings or gleeting ſores, the diarrhœas and fevers which, in a military hoſpital, are ſo much to be feared; and alſo, to leſſen the danger of any ſudden movements which the ſickly part of an army may be forced to make. The adheſion is almoſt completed with us before that term in which they lifted their firſt dreſſing, in fear and trembling, and with a tourniquet round the limb, leſt the arteries ſhould burſt out*.

In ſhort, every ſtep of our inquiry proves moſt clearly to us, that ſurgeons have been driven into this line of conduct by the ill ſucceſs of their amputations, till at laſt it degenerated from a queſtion, Whether, in certain circumſtances, we ſhould amputate a limb? into a queſtion, Whether amputation could be ſo performed, as to ſave many lives? Belguer was driven into this line of conduct by the ill ſucceſs of amputation in

* No doubt, a great abatement of any ſucceſs we may promiſe ourſelves, muſt be made for the bad air of ſuch an hoſpital, which will not allow adheſion to take place, neither ſo regularly, nor ſo eaſily, as in a healthy hoſpital, or in private practice.

the former years of the war, and we ſtill find the French ſurgeons harping upon the old ſtring. But it is very plain, that the ſucceſſes of the Pruſſian ſurgeons are not to be received as rules for the French ſurgeons, nor the ill ſucceſs of the French to ſtand as precedents for the Britiſh ſurgeons;—nor are the operations of the year 1745 to be put in competition with thoſe of the year 1795: The army hoſpitals give no rule for a county infirmary, nor a great hoſpital for a ſmall one;—nor is private practice to be guided by hoſpital practice. We muſt, in the general queſtion, make our calculations upon a greater ſcale, riſking ſometimes more, ſometimes leſs, the degree being left to the diſcretion of the ſurgeon;—and if the foregoing reaſoning can be of any ſervice to the young ſurgeon, it can be only by hinting at a few of the very complicated principles which are to regulate his conduct.

"Thus we perceive how ſtrangely a man's opinions grow up in his mind, diſtorted by a thouſand circumſtances." Belguer forbade amputation, while Schmucker, who ſucceeded him in the care of the Pruſſian hoſpitals and camps, cuts off the leg where the tarſus only is ſhot, and in almoſt all the dangerous wounds of the lower extremities. Pott adviſes amputation, becauſe he had practiſed chiefly in a crowded ill-aired hoſpital, where it was dangerous to attempt the ſaving of limbs, while it was but too eaſy a matter to cut them off. Kirkland, on the other hand, is againſt amputation, becauſe he practiſed chiefly among hale and ſtrong country fellows,

who, after their accidents, continued to live in the country, with a wholesome diet and pure air. In reminding you of these various and fluctuating opinions, I do not impeach the conduct of these excellent surgeons; I only warn you that these authorities are but the opinions of men, of mere men;—that the example or precepts of the greatest surgeons, though they may direct and assist your judgment, can never give you an express rule;—that it is upon your own judgment chiefly that you are to rely:—That it is, indeed, your duty to study the general argument with all possible care; but that the variety of circumstances is such as to make each individual accident a peculiar case,—a variety for which there is no express nor absolute rule.

When I say to you, that you are to trust chiefly to your own judgment, I would have you keep in mind these chief points, that you cannot save all those whose wounds and fractures you pronounce to be simple, and attended with little danger;—nor will all those patients inevitably die, whose limbs are so bruised, that you advise them to be cut off:—And you must consider, above all, how much your patient's life depends on the decision of the moment, and how melancholy the consequence is, of your allowing that happy moment to elapse, which is never to be redeemed.

I was called, one evening, to a man of forty years of age, in moderate health, who had a simple fracture of the tibia only. The smaller bone was unhurt,—there was no distortion nor any great inequality,—the end

of the broken bone was not particularly felt,—the ſkin was untouched;—and being called on the very inſtant of the accident, I had him ſafely and eaſily conveyed to bed.

He then proceeded to tell me the cauſe of his accident; but with ſuch rapidity of utterance, that I doubted not that he was much intoxicated. He was ſo reſtleſs and unmanageable, that I was obliged to make one of the young gentlemen ſit down in bed, above his ſound leg, and hold the broken one ſteady with both his hands. I was obliged, upon the whole, to be rough both in my manner and in my operations, till I had got good ſtiff ſplints, and a ſteady bandage firmly applied. But when all this was done, and I had laid my patient down in bed (for till now he had ſat upright, talking inceſſantly and vehemently), although I had given him a very large opiate, and a glaſs of warm wine, he trembled and ſhook ſo violently, as to make the bed ſhake under him, with ſhocks and ſudden convulſive twitches, which were truly alarming;—his ſhaking was at firſt like the cold fit of an ague, or like that convulſive trembling which often ſeizes women in childbed, which is at once ſo alarming and ſo harmleſs: but his ſhaking continued and increaſed all the evening, with a confuſion of mind, and wildneſs of countenance, which was really frightful; and with ſudden ſtartings which ſhook even the room, and would have diſordered the leg very much, if I had not ſecured it, by tying it down betwixt two great pillows.

Being now at leiſure to make deliberate inquiries, I

was aſſured, that he was not drunk,—had never been addicted to drinking,—had never been troubled with any nervous diſeaſe.—I called twice during the evening, and found him every moment more and more ſtrongly diſordered. Every new report, concerning his former habits, and the certainty of his being a ſober and healthy man, convinced me, that this was no ordinary caſe. I deſired, that Dr. Monro might be called in.—Very large doſes of muſk, opium, and camphire, were given for three days.—During all that time, night and day, he continued inceſſantly ſhaking, ſo as to move the bed under him;—he never ſlept,—he was always wild, ſometimes highly delirious, ſometimes ſtruggling violently to get out of bed, and ſometimes ſlightly convulſed. He laboured in this miſerable condition for three days, fell ſomewhat lower in the fourth day, and then died.

Upon diſſecting his limb, I found the ſkin and muſcles entire,—the tibia only broken, and that fairly acroſs;—there was no remarkable ſplinter of bone, and, as far as I could diſcover, no lacerated nor wounded nerve,—there was but little thickening, as yet, of the ſurrounding membranes,—little effuſion, and that not yet gelatinous, but ſerous merely,—no inflammation;—and, notwithſtanding all the violence of his diſorder, there was not even the ſlighteſt ſwelling of the ſkin;—every thing entitled me to ſet this down, as one ſingular inſtance of the uncertainty of general concluſions, and how little we are entitled to ſay, that any caſe, even the moſt ſimple, is abſolutely ſafe.

On the other hand, we know, from frequent experience, what ſtrange recoveries Nature and time

will bring to paſs, where the moſt judicious ſurgeons have declared the caſe abſolutely deſperate, and adviſed amputation. I may fairly give Mr. Lucas as an example, of a judicious ſurgeon condemning a limb; and how well he reaſoned, in ſo doing, in the following caſe, the ſequel will explain; and as for this caſe itſelf, it is one of the moſt ſingular in all reſpects,—it proves, in the moſt unequivocal manner, that although the conſtitution ſhould be ſo ſtrong, and ſo well managed, as even to bring the patient ſafely through all the dangers of a nine month's cure; yet the limb ſo preſerved, will be rather a burden than a help to the patient, who will ſometimes, even after the cure has been accompliſhed, be obliged to have it cut off:

"Eſther Parſons, aged 73 years, was admitted into the infirmary, as Mr. Lucas's patient, with a compound fracture of each leg, from a coal-waggon paſſing over them. One of her limbs was taken off above the knee immediately, according to Mr. Allanſon's method. In the other leg, four inches of the tibia were removed, and due pains taken to make the woman as comfortable as her deplorable ſituation would allow.

"After a confinement in bed for upwards of ten months, various attempts were made to ſupport her upon crutches; but after trying, for a few weeks, ſhe endured ſo much pain, that ſhe begged for the removal of a limb, that was to a degree burdenſome, without a proſpect of any amendment *."

* Page 234.

This old woman had lain in bed, and been supported, no doubt, with some difficulty, through all the pains and dangers of a nine month's cure.—She was now well;—she had been trying, for some weeks, to walk with crutches;—she was a woman too, whose work being all of a sedentary kind, she would have felt less the awkwardness or inconvenience of a deformed leg; but yet such was her sense of her own situation, that she begged to have this remaining leg cut off;—she had suffered amputation already, and knew but too well the pain she was to undergo, and this was no ordinary case, in which the patient was to lose a diseased limb;—she was to lose now both her limbs, and to crawl upon the ground. This is the very purest case of all; it was determined not by the rules of surgery, nor by the prejudices of the surgeon; it was determined by the patient's feelings and consciousness of her own condition. It proves, that her surgeons judged wisely, in cutting off that leg which they did cut off; and that they had better, also, have cut off that which they had tried to save. It proves, that when there is a question about amputating, in a very bad compound fracture, the question is, Whether the patient will consent to lose the leg at once, or risk the dangers of immediate gangrene and death? and after escaping these first dangers, still encounter the pains and distresses of a tedious cure. And it almost proves, that wherever judicious surgeons put the question among themselves, of cutting off or of saving a leg, that leg is so shattered, that it is hardly worth the saving; of which we have also another striking

example in the next page, where Mr. Lucas ſays, "James Walker, upwards of ſixty years of age, was admitted into the infirmary with a very bad compound fracture, which prevented him from having his bed made for nearly nine months. At firſt every attempt was made to unite the wound by the firſt intention; but a ſuppuration ſoon prevented ſuch an effect. He was repeatedly in imminent danger, and often expreſſed a wiſh to have his leg taken off. He did in *time recover;* but, for ſome years, his limb has continued of *little uſe to him.*" * We know too well, how much miſery is cauſed by a leg which is of little uſe; and we may underſtand by this, that thoſe ſurgeons, who boaſt of cures of this kind (a folly which Mr. Lucas is far from being guilty of), have more pride in relating the caſe, and telling what difficulties they have encountered, than they could have in ſhowing the limb which they boaſt of having ſaved, or explaining how well the poor man was able to earn his bread with it.

It recals many ſcenes of diſtreſs, which every ſurgeon muſt remember to have ſeen, of fine healthy

* Theſe two caſes ſettle entirely that queſtion, which Mr. Belguer propoſes ſo confidently in the following terms: "Quotus enim quiſque eſt, qui non penitiſſime commoveatur animo, ſi de membrorum amputatione mentio injecta fuerit, ſi homines, mutilis manibus, truncatis brachiis obambulantes, aut altero pede abſciſſo claudos, ac pedem ligneum trahentes, gralliſve innitentes magis quam ingredientes, viderit, quique non tolerabilius malum putet, membrum aliquod debilitatum varieque diſtortum atque defiguratum, neque ad priſtinos uſus PRORSUS aptum habere, quam eo prorſus carere."

young men belonging to wharfs, warehouſes, mines or coal-pits, having their limbs ſo ſhattered, that the ſurgeon has pronounced them dangerous in the extreme degree; and that if the patient lived in trying to ſave ſuch a limb, he muſt make a hair-breadth eſcape;—and, among thoſe ſo hurt, the ſurgeon will remember ſome dying of immediate gangrene,—ſome loſt during the ſecondary fever,—ſome waſted by the profuſe diſcharges and gleety ſores;—and a few ſubmitting, not without danger, to have their limbs cut off, even in the midſt of this ſuffering. The ſurgeon will recollect, with pleaſure, a very few who have laboured through their nine month's cure, and yet, even among thoſe few, he will alſo remember ſome who have undergone all this long ſuffering and confinement, to ſave a limb, which was more a burden than a help to them, ſuch as the ſurgeon was aſhamed of, and ſuch as the patient would fain have had cut off, but that he had not, like the old woman juſt mentioned, the courage to deſire an operation. It puts us in mind of that ſentence of Mr. Kirkland, which is one of the many inſtances of his ſterling good ſenſe in matters of practice:—"That the injury, which requires amputation, is of that violent nature that it cannot be miſtaken, the deſtruction of the parts, and the impoſſibility of their being ſaved, is manifeſt at firſt ſight *."—This expreſſion muſt, no doubt, be qualified a little, for the very beſt ſurgeons have been deceived, and no man of good ſenſe or honour will

* Page 12.

refuſe his opinion, for fear of being miſtaken, for fear of ſhame; we know too well the uncertainty of all reaſoning on what nature will do or ſuffer, and how weak our own judgment is. We muſt expect to ſee many live, whoſe limbs have been condemned, and ſome die whom we thought we could ſave. We muſt riſk ſome limbs which might have been preſerved, to ſave a few lives. When the queſtion comes to this, it is not whether the ſurgeon is right or wrong, but whether the poor man ſhall live or die. And then, if a judicious ſurgeon, upon deliberate conſideration of the whole caſe, ſhall think either that life is in danger, or that the limb cannot be preſerved, or that the one ſtands in competition with the other, he may deliver his opinion honeſtly; no ſhame can follow, whatever the event may be.

In this great queſtion, there is not one moment to loſe. You hold your conſultation in the evening; it is then that you decide the patient's fate; and by the morning matters are ſo changed, that whatever your opinion was, by that opinion you muſt abide.

"A patient was brought into St. Bartholomew's hoſpital, having a compound fracture of both the bones of the leg, within four inches of the ancle joint, and the muſcles alſo were much torn. Mr. Crane, who was ſoon after ſent for, took no ſmall pains to perſuade the man to loſe his limb, as the only chance of preſerving his life; but being unable to prevail with him, Mr. Crane removed nearly two inches of the tibia, placed the limb in an extended ſtate, and gave ſuch directions as he thought neceſſary.

"The next morning, the patient having ſuffered more than he could poſſibly have done from an operation, was now deſirous of ſubmitting himſelf; but Mr. Crane was of opinion that ſuch a ſtep could only tend to haſten his death, which happened upon the third day after the accident."

Thus, in all ſuch caſes does the patient's fate hang upon the deciſion of a moment; and whenever the limb is ſo ſhattered, by a cannon ball, by the burſting of a bomb, by a waggon wheel paſſing over it, by the falling of any great weight; whenever a limb is ſo cruſhed that there are many chances againſt its being preſerved, and that the attempt muſt immediately endanger the patient's life, and that the limb itſelf when ſaved, will moſt likely be ſhort and diſtorted, ſo as to be rather an encumbrance than a help to him, in ſuch caſe it ought to be cut off. But where a lacerated and bleeding artery is added to theſe dangers, the queſtion is more eaſily determined; this either weakens the patient by the open bleeding, or diſorders the limb ſtill more by the inward driving of the blood; it is not perhaps impoſſible to ſave the patient, but yet the chances are ſo many againſt him, that it would be much better the limb were cut off at once.

"A *coal miner* was admitted into the Leeds infirmary with his leg terribly ſhattered, by a fall of coals, ſeveral pieces of which had penetrated into the broken fleſh, and was mixed with the muſcles. At firſt the bleeding was violent, but it gradually abated; cooling remedies were applied, and a tourniquet was kept in readineſs. The hœmorrhagy always

ceaſed before any artery from which it came could be diſcovered. Although every attention was paid by a perſon placed to watch the limb, the patient died in ten days. Neither the habit nor ſtate of the limb were ſuch as to render amputation adviſable, unleſs it had been done early."

Once more I muſt obſerve, that if theſe reaſonings are uſeful to the young ſurgeon, it muſt be only by my having hinted at a few of thoſe very complicated principles which are to direct his judgment,—no ſenſible man has ever ventured to determine, nor will dare to determine this as a general point;—there is no poſſibility of defining, beforehand, any future caſe; there is no poſſibility of conceiving and marking the various degrees of injury, and the various combinations of contingent circumſtances; for, the conſtitution of the patient, his accuſtomed way of life, his former diſeaſes, or his preſent health, his ſtate of mind, his alarm or his coolneſs, the abſence or the preſence of fever, the conveniences or hardſhips of his ſituation; even the manner of his fall, along with the degree and form of the injury; in ſhort, a thouſand undeſcribeable circumſtances muſt affect the ſurgeon's judgment; ſo that there can be no ſpecific caſe deſcribed, no abſolute rule delivered; each accident is an individual caſe; and the conduct of it, together with the ſafety of the patient, is to reſt entirely on the diſcretion and abilties of the ſurgeon.

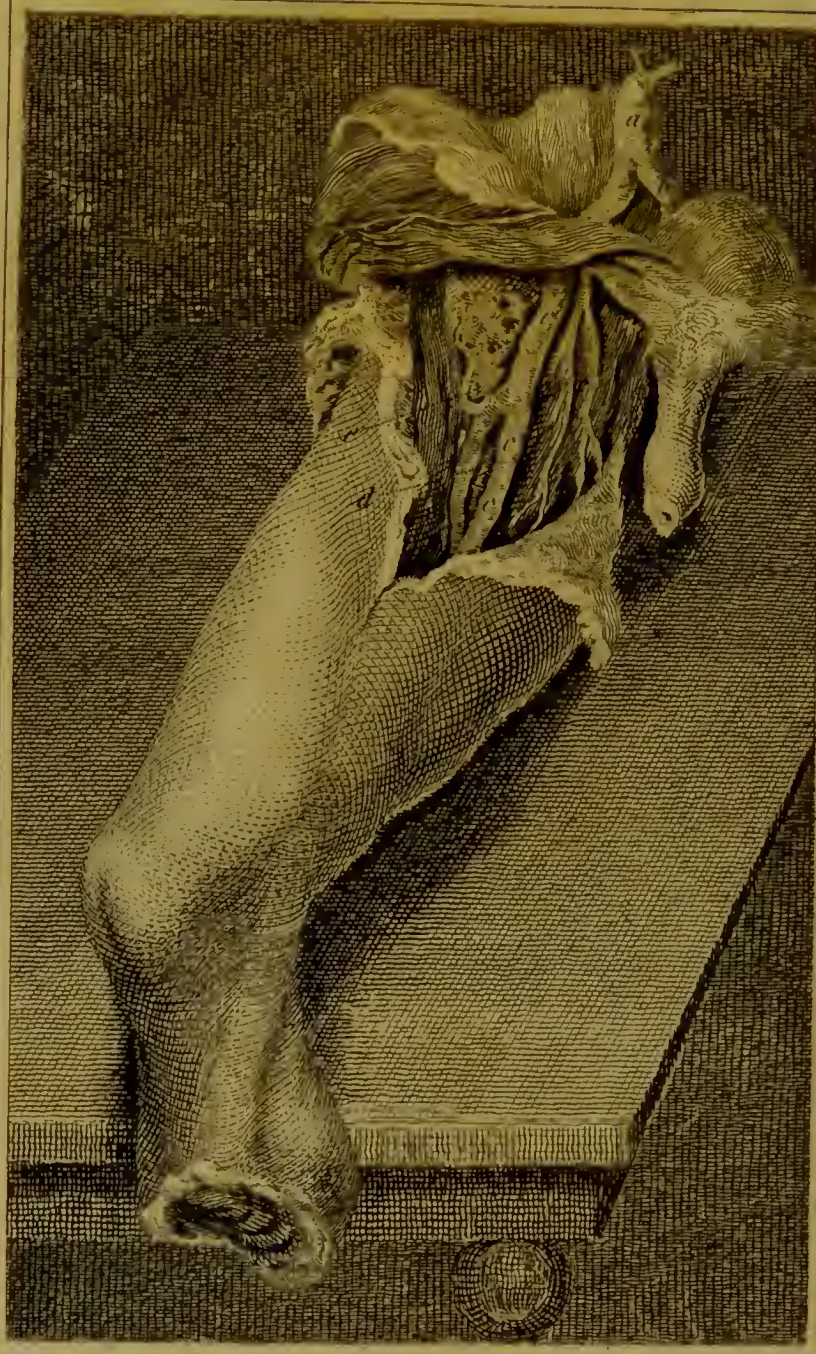
But as general rules, which ſtill are not beyond the reach of frequent exceptions, perhaps the following aphoriſms may be received.

1ſt, The chief caſes requiring amputation are thoſe in which the limb is cruſhed by a great ball, where the muſcles are reduced to a mere pulp, the bones broken, the limb already nearly in a ſtate of gangrene,—or where a bomb or great bullet has broken the bones and hurt the joint, although it ſhould not have torn the ſkin, either from its being an oblique ball, or from its being almoſt ſpent.

2dly, A limb having the great bones broken by a muſket ball piercing the limb may be ſaved; a limb in which the ſecondary branches of the arteries, or even the great trunk is wounded (if the bones be unhurt), may, as in the caſe of any more ſimple aneuriſm, be ſaved. It is only the complication of aneuriſm, broken bones, and wounded joint that makes the caſe abſolutely dangerous: and ſince no complication of circumſtances can admit of a general rule, this muſt be left to the diſcretion of the ſurgeon, who muſt prepare himſelf by a review of all kinds and degrees of danger, to reaſon upon the circumſtances of each caſe.

3dly, It is but too plain, that there is a caſe of neceſſity, and a caſe of election, that often in a flying army, or in a dangerous camp, we muſt be under the diſtreſſing alternative of cutting off limbs, which, in happier circumſtances, might have been ſaved, or of ſeeing our patient die a miſerable and violent death. It is eaſier to be carried in waggons with a well amputated ſtump, than with ſwelled and broken limbs coated with their own blood, and new arteries torn by the fractured bones at every ſtep; and, therefore, if your

PLATE I.



A. The Arteria Iliaca Communis.
b. The Arteria Hypogastrica in the Pelvis.
C. The Femoral Artery.
d. The Arteria Profunda Femoris.
e. The Arteria Articularis Externa.
f. The Cutaneous Veins lying by the Artery.

PLATE II.

Arteries of the Pelvis.

a. The Common Iliac.
b. The Hypogastric
c, c. The Gluteal.
d. The Ischiatic.
e. The Pudic.
f. The Thyroid.
g. The Epigastric

Arteries of the Thigh.

b. The femoral Artery.
c. The great Arteria Profunda.
1. Its External Circumflex Artery.
2. Its Internal Circumflex Artery.
3. 4. 5. Three of its Perforating Arteries.
k. l. The Popliteal Artery.
m, m, m, Its Articular Arteries.

n. o. p. The three Arteries of the Leg.

J. Bell del. et sculp.

patient having a terribly fractured limb, cannot lie in quiet; if you have reaſon to fear, that before he can arrive at any hoſpital, the limb will have fallen into gangrene, or the man himſelf be delirious or convulſed; if he have wounded arteries, which the ſurgeons cannot ſecure, and that he cannot have ſkilful nurſes, or young ſurgeons to watch the bleedings, you muſt cut off the limb. But here alſo much is left to the diſcretion of the ſurgeon. Nothing ſeems more harſh or unfeeling, than to ſay that any circumſtances can be an apology for a thing which ſhould not be done; but ſtill it is plain, that the circumſtances of an army, or a beſieged city, make a part of the caſe of every individual ſoldier in that city or army, and that the neceſſity of the thing, according to the vulgar adage, is itſelf a law.

4thly, If the thigh bone be broken into many pieces, and with large ſplinters driven through the ſkin, if the knee joint be ſhattered and torn, if the tibia and fibula be terribly fractured, as by a ball, or a loaded carriage paſſing over it, and that along with that compound facture, with cruſhed bones, detached ſplinters, and the ſkin and muſcles macerated in a proportioned degree, there alſo be lacerations of the tibial and fibular arteries, the limb cannot be ſaved. And although the foot may be ſaved when a ball has paſſed through the heel bone, or has paſſed quite through the tarſus (although it have ſplintered all the bones), yet when the ball ſticks in the tarſus, it is a very dangerous wound (often followed by locked jaw or gangrene), in which it is difficult to

ſave the foot; but when both the ancle joint is laid open, and the tarſus alſo is much lacerated and diſordered, it is almoſt impoſſible to ſave the foot, it had better be cut off *.

5thly, In this fourth rule I have mentioned chiefly the dangerous wounds of the lower extremity; and the reaſon of my doing this falls now to be explained; for it is really in wounds of the lower extremity chiefly, that we are reduced to the hard neceſſity of cutting off the limb. The lower extremity is larger, forming a great proportion of the whole body, whence a high fever and greater pain enſue; and in its wounds there are larger arteries to bleed, greater bones to be reunited or reſtored, and larger maſſes of muſcle and ſkin, to fall into inflammation; but the chief danger is the confinement in wounds of the lower extremities, with conſequent loſs of health. The uniform poſture exhauſts the ſpirits, and the profuſe diſcharges exhauſt the ſtrength; and few have the reſolution to go through all the hardſhips of a nine month's cure. Whereas, in wounds of the upper ex-

* That none of theſe wounds can be cured, it is far from my intention to affirm; I know well that they have been cured; I have ſeen ſuch deſperate caſes cured. We have, among other caſes, one of a knee joint, another of a thigh bone terribly ſhattered, and yet cured by the celebrated Deſſault; but the queſtion is, Whether the dangers be not greater than the chances? and I think the proper thing to be ſaid on this occaſion is juſt this: "When a judicious man ſays that a limb ought to be removed, he does not mean that it is impoſſible, at all events, that ſuch limb can be ſaved, nor that the patient muſt infallibly die." Pott, p. 400.

tremities, the proportion of the wound to the whole ſyſtem is ſmall, the fever ſlight; the caſe is in all reſpects more manageable; a man wounded in the arm can be carried with little comparative ſuffering from a field of battle, and he is not confined for months to a loathſome hoſpital; the moment that his fever is gone, he is able to riſe, he recovers his health, and he preſerves it during the whole cure.

We ſtruggle long and patiently to preſerve the hand, for it is by his hands that the poor man earns his bread; but, in a great wound of the leg, we ought not, by a long confinement, to riſk his life to ſociety, or to thoſe who are depending upon him; and, when he is forced to loſe his leg, he, ſtill having his hands to work with, continues a uſeful citizen, though, no doubt, he will be uſeleſs as a ſoldier; and this very diſtinction conſtitutes, I believe, the chief difference betwixt the practice of the Engliſh and of the Pruſſian ſurgeon, whoſe deciſion on this point has been, if I am not greatly miſtaken, ſettled by ſome higher authority than that of a jury of army-ſurgeons.

6thly, Amputation ſhould, in thoſe caſes where the limb is plainly and irrecoverably diſordered, be performed upon the ſpot.

When the operation has been delayed, either by the inconveniencies of your ſituation, the tardineſs of conſultants, or by the real accidents and difficulties of the caſe; in ſhort, wherever the pain or ſwelling, fever, or convulſion, have come on, there you muſt refrain from preſent operation, and muſt try to ſave the limb. But again, after the patient, having eſcaped

the firſt dangers of gangrene, has lain for ſix weeks, or two months, under profuſe ſuppurations or exfoliating bones; if, while you are trying to ſupport him with bark and wine, with very poor hopes of accompliſhing a cure, he ſhould plainly be ſinking under the hectic fever, then again amputation may be propoſed; but it is, on one hand, very diſtreſſing to throw away all hope, and loſe the advantages which our patient has ſtruggled for, through ſo much ſuffering and danger;—while, on the other hand, his life, which was at firſt in danger from pain and gangrene, is now a ſecond time in danger from colliquative ſuppurations and a hectic, which waſtes his ſtrength;—but this very weakneſs, which has brought him into this condition, is ſo far favourable to the ſucceſs of the operation, that it may be fairly queſtioned, whether this ſecond period be not fitter for amputation than the firſt.

7thly, With regard to the operation itſelf, I may venture to affirm, that the ill ſucceſs of the French and Pruſſian ſurgeons proceeded from operations either done under inauſpicious circumſtances, or in themſelves ill performed; and that, by a prudent choice in point of time, and neatneſs, in the manner of performing the operation,—a particular care in ſecuring the arteries, and every endeavour to keep your patient clean and warm in an eaſy condition, and in general health, you will be ſucceſsful, not indeed in the proportions of private practice, but in proportion to your means and opportunities; and more than this, no man of good ſenſe can look for.

8thly, To conclude; you muſt never amputate during fever, pain, convulſion, great ſwelling of the limbs, but moſt eſpecially, during that high-coloured inflammation which betokens approaching gangrene; there the diſeaſe is in the conſtitution; by cutting off the limb, you do not cut off the diſeaſe:—The gangrene, in two days, ſhows itſelf upon the ſtump, or the convulſions, which ceaſe, perhaps, for a moment, return along with thoſe ſtartings which follow amputation; and then follow a bending back of the body, locked jaw, and a very cruel death. This is the reaſon of our performing amputation, either on the inſtant, viz. before theſe terrible ſymptoms have begun, or later, and after they have ceaſed; this is the foundation of Le Dran's axiom, "That where there is plainly a neceſſity for loſing a limb, the ſooner it is done the better."—And my intention in this reaſoning, and theſe remarks, is to eſtabliſh this rule in your minds above all the ſeduction of wonderful caſes, which, though ſurely true, are yet mere exceptions, which it were better for you not to know, than truſt to too much *.

Here I feel it natural to expreſs my diſlike, once more, of this unphiloſophical way of ſetting up particular exceptions, which our collections abound with,

* I have mentioned my intention of giving a proper review of Belguer's opinions, of which ſome of theſe ſtrictures may perhaps be thought in ſome degree a refutation; but yet I am ſenſible that ſuch an undertaking would be tedious to ſome, and to many, I hope, quite ſuperfluous.

againſt general rules, of which our ſyſtems are very deſtitute.

The true appearance of theſe caſes is really amuſing to a deliberate obſerver; and the concluſion, which ſhould be drawn from them, is very obvious. We could, I think, upon an emergency, produce ten or twelve tales of knives cut out from the ſtomach ſafely,—as many caſes of gangrenous herniæ cured,—a hundred wounds of the brain, with great ſpoonfuls of it, diſcharged, the perſon continuing very ſenſible and witty, and ſometimes, as it has been remarked, wittier than before; and moſt eaſily could we produce a hundred good cures by the Cæſarean operation, the woman being no more hurt than if ſhe had been bled in the arm for a headach. And yet, notwithſtanding all this, no man will believe, that knives are eaſy in the ſtomach, ſtrangulated herniæ ſafe, or wounds of the brain without danger; neither ſhould Mr. Belguer's twelve caſes, nor any twelve caſes produced by any other man, induce a ſurgeon to believe, that gun-ſhot wounds, with lacerated arteries and broken bones, are ſafe, eſpecially if that ſurgeon have ſeen (as indeed we ſee daily) a patient dying of gangrene, from a luxated ancle, in the very moment in which his ſurgeons were conſulting about cutting off his leg.

Such ſtrong repeated proteſtations, upon this ſingle point, cannot be ſuperfluous, when we ſee a whole army of ſurgeons, deputing, as it were, their head ſurgeon to ſay, In all the Pruſſian camps and hoſpitals during a whole war, among ſix thouſand wounded men we have not cut off one ſingle limb!—indeed,

the impreſſion which ſuch an aſſertion muſt make, and the high credit of Belguer's book in this country, leads me, unpleaſant as it may be, to the taſk of explaining his book to you, which ſhall be the ſubject of my next diſcourſe.

THE END.

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